THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

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WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the Manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other Articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.

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WANTED, a Practical Manager, who thoroughly understands Gas Making, taking Meters, and keeping and collecting Accounts.

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JOHN WILLIAMS, Secretary.
Water and Gas Office, Llandudno, Jan. 10, 1859.

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WANTED, for the Nantwich Gas-WORKS, a Man competent to superintend the MANUFACTURE of GAS and to repair Meters and Fittings. Salary 30s. per week.

Testimonials as to fitness, age, &c., to be sent in on or before Tuesday, the 1st of February, and the appointment to take place on the 1st of March, when candidates, who are expected to attend, will have notice

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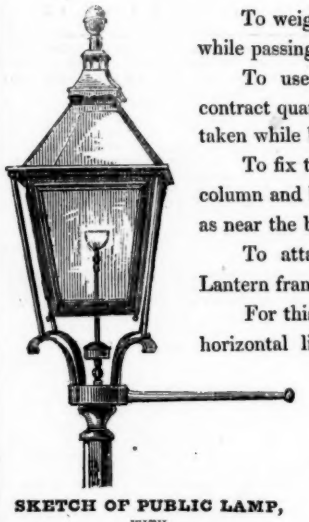
PROPOSALS FOR USE OF WM. SUGG'S PUBLIC LAMP GOVERNOR.



SKETCH OF PUBLIC LAMP, WITH GOVERNOR ATTACHED.

To weight every Governor until it gives a pressure of 8-10ths of an inch* while passing the quantity required at burners.

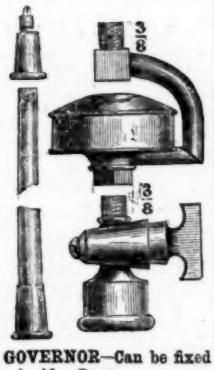
To use Lava or other incorrodible burners, which shall consume the contract quantity (say 5 feet per hour), at 8-10ths pressure. Pressure to be taken while burning.

To fix them, wherever practicable, underneath Lantern, between the top of column and bottom of Lantern; or, if fixed inside the Lantern, to keep them as near the bottom as possible.

To attach them to Bracket Lamps, anywhere between the wall and Lantern frame.

For this purpose, the Governors are made with inlet and oulet tubes, in horizontal line, both screwed, $\frac{3}{8}$ brass; the inlet tube supplied with $\frac{3}{8}$ brass socket; the outlet tube will fit a $\frac{3}{8}$ brass union.

* The Governors are supplied properly weighted and adjusted to this pressure, free of extra charge.



GOVERNOR—Can be fixed inside Lantern, or underneath, as shown opposite.

Lava Burners, No. 5 Batwing. to consume 5 feet per Hour, at 8-10ths pressure.

WILLIAM SUGG,
GAS ENGINEER, AND MANUFACTURER OF GAS-METERS AND GOVERNORS FOR GAS-WORKS AND CONSUMERS,
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CANNOT BE OVER OR UNDERCHARGED WITH WATER,

and they consequently register the quantity of Gas consumed with greater accuracy than Meters in which the Water-Line is variable.

MANUFACTURED BY

CROSLEY & CO.,

GAS-METER MANUFACTURERS,

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N.B. The Patent Self-Adjusting and Compensating Apparatus may be applied to the ordinary Meter.

Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night.

Also, Manufacturers of EXPERIMENT METERS, GASHOLDERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c. &c., similar to those used by Mr. King, of Liverpool.

REPORT ON CROSLEY AND GOLDSMITH'S PATENT METERS.

London, November 17, 1858.

Having been invited by Mr. William Crosley to examine the performance of the gas-meter recently patented by himself and Mr. Goldsmith, and manufactured by the firm of Crosley and Co., of 103, Southwark Bridge Road, we assembled at their manufactory, and now report the result of our examination.

We did not think it necessary to check the accuracy of the testing gasholder employed, as Mr. Barlow had done this on a prior occasion; and he assured us that he had found the index to agree, foot by foot, with a standard cubic foot measure containing 62·321 lbs. of distilled water, at the temperature of 62° of Fahrenheit and a barometric pressure of 30 inches, being the standard of measure established by law. Our first care, therefore, was to so adjust a 20-light experiment-meter that its registration coincided exactly with the index of the testing gasholder, which meter we subsequently used as the standard testing meter in the experiments hereinafter recorded, taking care from time to time to check its accuracy by the gasholder.

The chief novelty in Messrs. Crosley and Goldsmith's meter consists in an ingenious contrivance for maintaining the water at a uniform level, so that the capacity of the measuring-chamber shall not be affected by a deficiency or by an excess of water. It is well known that the registration of ordinary wet gas-meters, and more especially of the smaller sizes, is liable to considerable variation from this cause; and we consequently selected a 3-light meter for our first series of experiments, and commenced by subjecting it to the severest and most unfair test to which any meter can be put—that is, by adding lights till they commence to burn unsteadily. In this manner, a 3-light meter was tested with 10 lights, with the following results:—

EXPERIMENT *No.* 1.—3-*Light Patent Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
10	m. s. 30 23	25·36	25·00	1·44 slow	50·08	6·2

During the course of this experiment we added 10 cubic inches of water, without producing any appreciable effect upon the registration or upon the steadiness of the lights. We then reduced the number of burners to 3.

EXPERIMENT *No.* 2.—3-*Light Patent Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
3	h. m. s. 1 13 5	19·67	20·00	1·67 fast	16·15	1·8

We continued adding water by 5 cubic inches at a time during this experiment, till 20 cubic inches had been added in all, without flooding the syphon or altering the ratio of difference between the two meters; but with 45 cubic inches of water the syphon became flooded, and the lights were extinguished.

Our next experiment was with 1 light, by which means we obtained the results of experiments with the maximum and with the minimum rate of consumption of which this sized meter is capable.

EXPERIMENT *No.* 3.—3-*Light Patent Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
1	m. s. 50 0	4·91	5·00	1·83 fast	5·89	1·1

The extreme range of variation from absolute truth to which the meter is liable, is therefore between 1·44 per cent. slow and 1·83 per cent. fast, till the surplus-water reservoir is exhausted, when the meter becomes an ordinary one; but when it is borne in mind that this reservoir contains 54 cubic inches of water to compensate for evaporation—that some ordinary high-spouted 3-light meters are liable to variations to the extent of 60 per cent., according to the height of the water-line, and that the tolerated variation is 4 per cent at the adjusted water-line—it is evident that the objects aimed at by the inventors have been in a great measure successfully attained.

We continued our experiments by subjecting a 20-light meter to similar trials, commencing with 38 lights.

EXPERIMENT *No.* 4.—20-*Light Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
38	m. s. 8 8	19·94	20·00	0·3 fast	144·4	1·75

We then added water till the syphon became flooded and the lights extinguished, which took place by the addition of 70 cubic inches of water. We then repeated the same experiment with 60 cubic inches of water, added after the overflow-plug had been replaced.

EXPERIMENT *No.* 5.—20-*Light Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
38	m. s. 8 8	19·94	20·00	0·3 fast	147·0	1·75

It will be seen that the registration was not affected by the additional quantity of water; but, being desirous of trying the effect of passing a larger quantity of gas, and there being no means of burning more, we opened a cock leading into a chimney-flue by which the gas could escape.

EXPERIMENT *No.* 6.—20-*Light Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
Not determined	m. s. 6 55	19·99	20·00	0·05 fast	173·4	2·25

It now only remained for us to ascertain the effect produced by reducing the consumption to a low rate; but, as the burning of 20 feet of gas through a single burner would have occupied several hours, we thought our object would be sufficiently accomplished by burning four lights.

EXPERIMENT *No.* 7.—20-*Light Meter.*

Number of Lights supplied.	Duration of the Experiment.	Consumption by Test Meter in Feet.	Consumption by Patent Meter in Feet.	Variation per Cent. in Index of Patent Meter.	Rate of Consumption in Feet per Hour.	Friction of the Meter in Tenths of an Inch of Pressure.
4	h. m. s. 1 6 40	19·87	20·00	0·65 fast	17·8	0·9

The surplus-water reservoir will hold 208 cubic inches of water, available to compensate for the waste by evaporation; and, as the meter will register correctly with a surplus of 60 cubic inches, there is ample provision both for the abstraction of water by evaporation and for an increase by condensation.

We also tested the effect of suddenly opening and closing the gas supply-cock, and found no inconvenience to arise on this head. The flow of gas was steady and uniform, and the pressure was not sensibly affected by the action of the pumping machinery.

Our experiments lead us to the conclusion that the patent meter is a practical and substantial improvement upon the ordinary wet gas-meter, inasmuch as the capacity of the measuring-chamber is not diminished by an excessive supply of water, nor can it be increased by drawing off water. On the one hand, therefore, the consumer is protected against any intentional or negligent overfilling of the meter, the result of which is to exaggerate the registered quantity of gas actually consumed; and, on the other hand, the gas manufacturer is protected against the fraudulent abstraction of water by the consumer, the effect of which in the ordinary meter is to cause it to register less gas than is really supplied. Time alone can determine whether these advantages are gained at the expense of its durability, or by any complexity which may render its utility doubtful; but, so far as we are able to form an opinion upon these points, the patent meters are not liable to any greater derangement than the ordinary wet meters, nor do we believe they will be less durable.

We ought to remark that these meters require to be adjusted and tested after being worked a short time under pressure, in order to give the pumping apparatus sufficient time to raise the water to the proper level in the measuring-chamber. Should this precaution have been neglected, the meter will register rather more than the correct quantity of gas supplied after that level has been attained; and this is an error into which persons who are accustomed to the testing of ordinary wet meters are liable to be led in testing the patent meters.

We have already condemned by implication the practice of transmitting more gas through a meter than it is intended to supply. That quantity is regulated by manufacturers generally upon the basis of 100 revolutions of the measuring-drum per hour, and any increase upon this speed is attended with such diminution in the effective pressure of the gas after it has passed the meter, that our having made experiments at greater speeds must not be taken as an expression of our approval of the system of propelling meters at three or four times their proper speed; on the contrary, we condemn it strongly, as involving an increase in the pressure at which the gas will have to be supplied in the mains, and a consequent augmentation in the leakage.

(Signed)

GEORGE LOWE, *C.E., F.R.S., Engineer-in-Chief to the Chartered Gas Company.*

JOHN KIRKHAM, *C.E., late Engineer-in-Chief of the Imperial Gaslight Company.*

GEDDIE PEARSE, *late Engineer-in-Chief to the Incorporated and Provincial British Gaslight Companies.*

THOMAS G. BARLOW, *Civil and Consulting Gas Engineer.*

JOURNAL OF GAS LIGHTING PENNY NEWSPAPER

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TO CORRESPONDENTS.

R. A., KEIGHLEY.—*Pipes of 5 inches diameter and upwards should be cast in dry sand moulds set vertically. Smaller sizes are usually made in green sand in inclined moulds.*

NOTICES.

Subscribers who have not paid their subscription for 1858, or for any previous years, are requested to remit the same forthwith, in the manner specified below.

The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing-Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 18, 1859.

NOTES UPON PASSING EVENTS.

IT is with very sincere regret that we observe the course recently taken by Dr. Letheby in matters connected with Sanitary regulations. Within the last few years the Doctor had indeed laid aside much of the quackery and dogmatism of the modern school of Sanitary Reformers, as the fashionable empirics are pleased to style themselves; and in the matter of the inquiry into the scheme of the Metropolitan Board of Works for the great intercepting sewers, he certainly assumed a position which was equally independent and philosophical. But if Dr. Letheby could thus, on the occasion, become the representative of truth and of common sense, he seems, at a more recent period, to have been unable to rise above the prejudices of his craft; and to have been unable to perceive that the manner of doing a good is often of a far greater moral importance than the physical benefit to be derived from it possibly can be. This lapse of Dr. Letheby into the absurdities of the centralizing official school is also accompanied by a great deal of the false philosophy of the day; and we, therefore, hope that he and our readers will bear with us, whilst we endeavour to call attention to what we believe to be the mischievous portions of the "Sanitary Report of (*sic*) the City for the Autumn Quarter," as the *Times* calls that document, with its usual disregard of English Grammar.

Dr. Letheby begins by stating that there had been an increase in the mortality from zymotic diseases during the autumn quarter of 1858; and then he goes on to say that "bad as this mortality looks in its statistical form, it gives no idea of the causes which are at work in producing it." After alluding to the *almost inhuman habits* that are at the root of the mischief, he adds—that "it says, or seems to say, but little in favour of sanitary science, when after ten years of the exercise of its labours, there is so full a proof of what may be called the unchecked progress of disease." Some grandiloquent nonsense, in the Simon style follows, about the state of some parts of the City; and thereupon Dr. Letheby expresses, in fact, his regret "that no despotic power should exist for the purpose of dealing with such places as we (who?) will, and to subject them to the severest laws of hygiene"—he says, indeed, that nothing will serve to eradicate the unwholesome influences at work in those places, but an absolute power in dealing with them!

Now, in the first place, it does strike us as being odd, to use no stronger phrase, that the officer of a body, which has always assumed to itself credit for resisting absolute power in any form, should thus publicly renounce the principles of his employers. If the Doctor be right in his proposition, it can only be on the score of the duty of society to enforce the observance of correct doctrines on any, and every, subject; and, by a parity of reasoning, if the principles of a science (which has only, according to the Doctor himself, been practically applied within the last ten years) ought to be enforced by a despotic power, the principles of religious or of constitutional government, which have been practically applied for a hundred times twenty years, ought to be imposed by a similar power. But, setting aside the consideration of the logical consistency of Dr. Letheby's position, we ask whether any reasonable man would consent to conferring absolute powers for enforcing the conclusions of a set of theorists, who avow that they have only been able to study for ten years the application of what they are pleased to call scientific principles? We, and most lay readers upon this class of subjects, had, it is true, believed that, more than two thousand years since, Hippocrates had written a treatise on "Air and Situations," which might be read with profit even at the present day; and we were equally led to believe that the men who sewered Rome, and who brought into the Eternal City the boundless supplies of water which were poured into its streets, exercised "some of the labours of sanitary science." Dr. Letheby's archæological knowledge seems thus to be about on a par with his mode of reasoning; and this is the more to be regretted, because the examination of the results which were obtained by the exercise of the absolute authority of the Roman sanitary officers, ought, if read aright, to convince any reasonable man that absolute power, even for good, is certain in the end to defeat itself. Ah! Dr. Letheby, you have forgotten the sublime word of St. Augustine, when he described the patience with which the great Ruler of the Universe tolerated infractions of his laws!—"*Patiens, quia eturnus.*" Not to use the phrase profanely, we urge you, if you really be convinced that you are right, not to injure your cause by impatience. Ten years is nothing in the history of a science, or in the life of a nation; and you may be sure that a legislation founded on such a narrow basis must be sorely exposed to error—especially if accompanied by absolute authority to enforce its conclusions.

Indeed, we here again beg to say that the first physiologists on the Continent deny, *in toto*, the correctness of the received classification of zymotic diseases which forms the basis of Dr. Letheby's reasoning. Moreover, it is to be observed that the great mortality of the autumn quarter of 1858 in London was accompanied by a remarkably "humid and stagnant condition of the atmosphere." To what extent ought this abnormal state of the air to have influenced the opinions of Dr. Letheby as to the pressing necessity for establishing an absolute authority to carry into effect his own sanitary crotchets? We suspect that they who recollect the history of the persecution of the

City Gas Company will hesitate a little before they subscribe to the new despotic doctrines of the Medical Officer of the City of London.

It also appears, from a very sensible Report by Mr. Haywood, "upon the Application of Charcoal to the Ventilation of Sewers," that Dr. Letheby has fallen into one of the "humbugs" of the day, which consists in speaking of the cost of large experiments solely as equivalent to a rate of so much in the pound, instead of naming the actual cost in any distinctly prominent manner. As to the scheme of filtering the air through charcoal, we ourselves are convinced that, in practice, it will prove a failure; because, as Mr. Haywood very properly observes, the escape of foul air into the streets is very far indeed from being the sole object to be sought for in the complicated problem of the ventilation of sewers. Even were the escape of foul air from the sewers the sole object to be obtained, it is more than doubtful, to us at least, whether an operation of this description could ever succeed upon the large and rough scale upon which it must be applied in London. And even if the successful application of charcoal to the purpose of arresting the escape of foul air from sewers be demonstrated, it by no means follows that the public authorities should incur an outlay equal to a fivepenny rate, until it has been proved that the charcoal air-filters and all their trumpery are the most efficient and the most economical means of producing the desired results. From some observations made by Herr Schrader, at the last meeting of the German Physicians at Carlsruhe, it would seem that cotton acts nearly as well as charcoal for the purpose of filtering air, and there can be no doubt with respect to its superior economy in the first outlay. Mr. Haywood was, we therefore hold, perfectly correct in the opinion with which he closed his Report. It would, indeed, be preferable to try some experiments on a practical scale, and in a particular district, where the results obtained could be closely observed, upon the various methods of arresting the foul emanations from sewers, than to rush blindly, on faith of some laboratory experiments, into works which, even by their projector, are estimated to require an outlay equivalent to a fivepenny rate.

It is the more necessary, we would here observe, to protest against the tendency of many short-sighted philanthropists to call out for absolute powers for enforcing ther own opinions upon the details of a science (to them) of only ten years' date, because the public is just now naturally excited by the sad accidents which have occurred at the Victoria Theatre, at the Polytechnic, and at Liverpool. There is a cry for a more stringent supervision of buildings, and consequently for the creation of a number of new places of inspectors or surveyors; whilst, oddly enough, the very parties who clamour the most for this additional inspection are either themselves officers appointed to carry into effect the existing law, or they point the moral of their tale about the insecurity of modern buildings by referring to the greater solidity of ancient ones. Now we ourselves happen to know one instance in which the District Surveyor of a part of the City, who had slumbered at his post for many years, became frightened one day by the occurrence of a very fatal accident near his district; so he started forth on an examination of the houses committed to his charge, and in one morning condemned no less than 21. Many of these houses, we know, only required trifling repairs; but, practically, there is no appeal from the decision of a London District Surveyor, who has indeed the absolute powers Dr. Letheby desires for sanitary theorists; and thus an enormous outlay was forced upon parties who, in many cases, were ill able to support it. There does not seem, therefore, when District Surveyors have such powers, to be any occasion for giving them others; all that those officers have to do is simply to insist that the provisions of the law are carried into effect; and it is, we would add, the especial duty of the Magistrates to see that none but capable men are named to places of such power and responsibility. Here, too, it is necessary to observe that the selection of district surveyors and of magisterial advisers is not usually conducted in such wise as to inspire much confidence in the parties concerned; at least the conduct of the Middlesex Magistrates in the late affair of the Colney Hatch Asylum should "give us pause" before any additional powers are granted to an irresponsible body of this description. But if we pass over these considerations, may not the question fairly be asked, how did it happen that in former times, when District Surveyors were unknown, buildings were erected in a more substantial manner than they are at the present day, when the inspections ought to be so numerous, and the Legislature has prescribed such minute precautions to prevent accidents? The answer partially lies in this, that in proportion as public authorities assume to discharge the duties which are incumbent on individuals, it relieves the latter from responsibility; and thus it happens that at the present day, when an accident occurs from the fall of a building, nobody can be punished, for the blame is distributable over so many persons that it can apply to no one in particular. Then, again, the peculiar state of house property in our cities indirectly affects the whole science of construction as applied in them; for, naturally, they who build with only a terminable possession are not likely to build more solidly than they can help doing. The tendency with us certainly is to shorten the duration of building leases; and with this shortening, unquestionably the style of house-building will become more and more temporary. How, then, are accidents to be avoided? So far as private houses are concerned, we believe that the most efficient course of proceeding would be to discourage the existing system of building leases, but at the same time we do not see how the Legislature can interfere with this detail of private property. As to public buildings, all that is required is that the Magistrates should select capable advisers, and then insist upon their enforcing the powers already conferred on them by Parliament. The *Saturday Review* very properly remarked that no supervision could have guarded against the accident at the Victoria Theatre; but the evil of a too-meddling supervision is precisely that it would render the public more liable than it actually is to panics such as caused that sad accident. After all, the more serious consequences of this class of calamities arise from the want of self-possession and of self-control in the public itself; and the remedy to this defect can only be found in the development of the moral and intellectual faculties of those who constitute mobs.

The investigation into the causes of the accident at the Polytechnic has not yet been concluded; and we are, therefore, precluded from making any remarks with respect to it. For the present, it may suffice to say that the style of investigation hitherto adopted does not seem likely to lead to any valuable result.

In the country, we hear still but little of new works, or of attempts to attain the Arcadian felicity of the Sanitary Reformers, unless such proceedings as those which have lately taken place at Richmond constitute exceptions. Some places—Bury St. Edmund's, for instance—with no true sewerage, and no water supply—a town which is, in fact, the very "Sleepy Hollow" of municipal improvement—Bury has, during the last quarter of the year, enjoyed a state of health so pertinaciously good as to induce us to suspect, either that the inhabitants have entered into a conspiracy to refute the dogmas of the Sanitarians, or that those dogmas may not be absolutely correct. At any rate, it is curious that some districts should thus enjoy a remarkably favourable state of health, whilst others are as markedly afflicted in an opposite direction; and the mortality returns of Bury and of Windsor for the last quarter ought to excite more than a passing comment. We hear that at Margate a vigorous attempt is shortly to be made to secure the erection of Water-Works; for, be it observed in passing, this favourite resort of London invalids, even though it boasts of one of the lowest rates of mortality of any district in the kingdom, cannot at present boast of a water supply: perhaps, then, when the capital of Thanet shall possess that blessing, its inhabitants may become the *struldbrugs* of the Registrar-General's Laputa. Southend seems disposed to run the same course with the rival bathing-place on the opposite shore of the estuary of the Thames, and it is also about to seek a water supply. In the case of the Margate Works, of course the water will be obtained from the chalk; and it will be an interesting problem to observe the conditions under which the water permeates this portion of the formation, for in the neighbourhood thus considered the upper chalk alone occurs, and the vicinity of the sea must affect, to some extent, the well waters below its level. At Southend the supply would come from the basement beds of the London clay, no doubt; but in this case also, it is possible that eventually the sea-water may affect the quality of that furnished by the well. We earnestly beg our correspondents to enable us to throw light on these interesting questions connected with the application of Geology to Engineering.

It might be worth while, also, here to remark, that at the meeting at Carlsruhe to which we before referred, Herr Böttger

called attention to the fact that occasionally tin pipes were found to be perforated, as though by an animal; and Herr Schönbein stated that he had observed organ pipes to be occasionally perforated in a similar manner. Some time since, the French Minister of War submitted to the Academy of Sciences of Paris specimens of cartridges brought back from the Crimea, in which the balls had been evidently eaten by a species of boring insect; and when we reflect upon the history of the reappearance of the *Teredo navalis* in northern seas, we naturally ask whether the simultaneous observation of the destruction of the objects above-mentioned be or be not connected with the appearance of some new insect in our parts of Europe. The subject has sufficient interest to both Gas and Water Engineers to merit more than passing attention from them; especially as the state of scientific knowledge on subjects connected with the philosophy of building materials is in so very unsatisfactory a state.

We have lately received, by the kindness of some private friends, copies of reports on the great works proposed to be effected for the improvement of the Ohio and of the Maas. These reports are indeed documents of singular interest at the present day, when so much is proposed to be done for the development of the means of water communication both in the old and in the new World; and they open up so wide a field of investigation, that we purpose to treat of them in a separate article. The question of the improvement of the Maas is, indeed, connected with the history of the past changes in the geography of this part of Europe; and there are few more instructive lessons to be found, both for Engineers and for Legislators, than those furnished by the modifications produced in the delta of the Rhine and Maas, within the historical period, by natural and by human means. The light thus thrown upon hydraulic operations in deltas, may be of use to those charged with the direction of the public Works of India, to which attention has again been called by an able article in the *Saturday Review;* there may be under these circumstances something appropriate in a notice of the Reports thus mentioned at the present day.

Whilst the name of India is fresh on our memories we would beg Lord Stanley to direct a little of his attention to the sanitary state of the countries he rules. At Birmingham, his lordship could utter complacently enough the hacknied commonplaces of the Chadwickian school about public health; now he is in power, he would do well to address himself to remedy the state of things prevailing, for instance, in Bombay. There the rate of mortality seems to be not less than 46·2 per 1000; or more than double that of England, and nearly double that of France—the mortality of the former being about 22·7, and of the latter 25·0 per 1000. Now that the Imperial Government has assumed the direct control of India, it behoves the English nation to insist that our rule should be a source of improvement and benefit to the natives upon whom we impose our laws; for conquest, or the occupation of a country by foreigners, can only be justified by their conferring blessings to which the natives themselves could not attain. One of these blessings would appear, in the case of the Bengal Presidency, to consist in the introduction of some sanitary regulations; and Lord Stanley's previous studies warrant us in urging him especially to take the matter into his own consideration.

A piece of news has lately transpired upon which we cannot refrain from congratulating the ratepayers of the Metropolis. It is to the effect that the Metropolitan Board of Works has concluded a negotiation with the Bank of England for a loan of £3,000,000 sterling, at the rate of 3¾ per cent. It now remains for the representatives of the ratepayers to take care that the money so raised is properly spent in carrying into effect the great works already decided in principle.

THE GOVERNMENT AND THE LOCAL BOARD OF HEALTH OF WOOLWICH.

A RATHER curious, and at the same time a very important, question has lately been mooted, between the authorities of the War Department and the Local Board of Health at Woolwich. It appears that the former administration have erected a large gas factory within the Arsenal for the purpose of lighting its various shops and roads; and that as there are in the neighbourhood of the Arsenal some large Government establishments, the War Office is desirous of lighting them also from its own works. Application has, therefore, been made to the Local Board of Health for permission to lay down the mains in the public streets between the Gas Factory and the Barracks; no doubt with the view of ultimately adopting the same course for lighting the Dockyard. The Local Board of Health have, we think, very fairly, declined to grant this permission unless the War Office consent to being placed upon the same footing, with respect to rating for municipal purposes, upon which the Gas Company of the locality is placed; so that, for the present at least, the gas-works at the Arsenal are confined to supplying the wants of that particular establishment, for the Law Officers of the Crown state that the War Office is not entitled to consent to the principle the Local Board seeks to apply.

One principle the Government authorities have sought to establish in the course of this and some other discussions, seems to us, however, to merit more than a casual observation. It is, that because no profit is made by its manufacturing operations, no obligation to support ordinary charges should accrue. This is a fallacy in the cases immediately before us: for though no profit goes to individuals when the State turns Gas or Cannon manufacturer; yet the State only so turns manufacturer in order to prevent individuals from gaining that profit. Now, if private persons conducted the manufacture, they would be obliged to support all the ordinary charges of members of the community; and it therefore seems to us to follow, that if the State enter into competition with them, it ought to be placed, *quoad* its manufacturing establishments, on the same footing as other manufacturers. Besides this, the collection of the six or seven thousand workmen which has taken place in consequence of the erection of the Arsenal at Woolwich, must necessarily bring occasional burthens upon the poor-rates and upon the other rates of the town; and though, no doubt, Woolwich gains immensely by the existence of the Arsenal within its limits, it does seem hard that the Gas Company especially should find itself rivalled, or supplanted, by an opponent which is freed from some of the heaviest burthens pressing upon private enterprise. The decision of the Local Board, in this instance, seems to be founded on considerations of strict justice, and we therefore hope that it will hold fast to the end; but even should it be disposed to give way, we seriously question whether it would be able to consent to the existence of unrated property in the public streets. Nothing but an Act of Parliament would, we believe, entitle the Local Board to grant an exemption from taxation to any description of property in the public streets; such a proceeding would, indeed, constitute a preference which would seriously affect the validity of the rates upon other parties.

Circular to Gas Companies.

Two important questions with regard to the rating of gas-works have been under the consideration of distinct tribunals during the last week, and one of them was brought to a conclusion on the 14th inst. by a judgment the effect of which is to reverse that given in the same case two years since by the predecessor in office of the present Recorder of Cambridge. The other case is still *sub judice*, and cannot therefore be made the subject of comment at present without inconvenience.

It will be in the recollection of our readers that on the hearing of the previous appeal Dr. Leapingwell, the deputy recorder of Cambridge, reduced the assessment on the whole property of the Cambridge Gas Company from £1658, at which it had been fixed by the overseers, to £492. 18s., which latter sum was arrived at by estimating the gas manufacturing station at 7½ per cent. per annum on the structural value of the hereditaments, and valuing the land occupied by the mains at a rent charge of one penny per lineal yard. Dissatisfied with this decision, the overseers called upon Messrs. Lee and Penfold to make a new valuation of the property, and in August last they made an award under a local Act, by which the works and mains were assessed at £3276 gross, and £2542 net; and it was against this assessment that the appeal just heard before a new recorder was lodged.

The company were advised to adhere to their previous system of attack upon the legality of the rate, and were prepared with a mass of eminent engineering evidence in support of their views, of which Mr. Hawksley was made the exponent. On the other hand, the parochial authorities fortified the evidence given by their professional valuers by the testimony of

persons practically acquainted with the letting of gas-works, who were unanimous in their opinion that the works would let to a tenant at a higher sum than the gross valuation made by Messrs. Lee and Penfold, and it does not appear from our report of the case that any serious attempt was made to shake their testimony on cross-examination. The appellants seem to have relied solely upon the arguments put forward by their counsel, that what a tenant would give for the works and the trade appertaining thereto was no criterion of the rateable value of the hereditaments, which can alone form the subject matter of assessment.

The issue of the proceedings borders so closely on the ludicrous, that we can scarcely refer to them without disturbing the gravity with which judicial decisions should be at all times treated. Perplexed by the wide range exhibited between the valuations of the two parties, the learned recorder seems at first to have taken the mean between the two extremes as the basis of his judgment, without regard to principles; and afterwards, when his attention was drawn to the absolute necessity of his adopting one or other of the principles enunciated before him for the purpose of carrying the question to the Court of Queen's Bench, he gave his adherence to that of Messrs. Lee and Penfold, but reduced their figures from £3276 to £1850 gross, and from £2542 to £1700 net. The report we give of these proceedings in another column requires to be carefully read in order to appreciate the degree of respect to which this decision is entitled. The duty of a judge is to administer the law, and it is certainly somewhat unusual to find him arbitrating on points of law instead of administering it, and compromising between principles instead of boldly deciding upon the evidence before him. Such we apprehend will be the feeling entertained in Westminster Hall when the case, which is to be carried there, comes to be argued, though the judges themselves are apparently in a labyrinth of entanglement on this subject by reason of a series of unsound precedents which they have not yet had the courage to set aside, but which this case may possibly give them an opportunity of reconsidering. If gas and water works are to be dealt with in the manner laid down in the railway cases, so also should Messrs. Barclay and Perkins' brewery, the Low Moor Iron-Works, and every other flourishing establishment of which the owners are also the occupiers; the only substantial difference between such establishments and gas-works in respect of their liability to be rated, being that the latter are carried on by joint-stock companies, and the former by private partnerships. Surveyors and valuers for the parochial authorities are, however, quite as much entitled to demand access to the trade books of the latter as they assume to be entitled to demand it from the former, whenever called upon to ascertain the rateable value of their properties; but the demand would be regarded in the one case as an impertinence, while the refusal in the other case would be complained of as a grievance. The able arguments of Mr. O'Malley and Mr. Keene were thrown away on a precedent-led recorder, but may be effectively urged when the matter comes before the Court of Queen's Bench.

There are some points of view under which this Cambridge case presents anomalies which throw doubts over the impartiality that should reign wherever the administration of the law is concerned. Mr. Pashley, the leading counsel for the parishes in this case, is judge of the Middlesex Sessions, and in that capacity has to decide, without appeal, all similar questions which arise within his jurisdiction. Whether the legal mind is so constituted as completely to sink the advocate in the judge is very questionable, and a sense of the delicacy of his position will, we apprehend, induce Mr. Pashley to hesitate before acting in his judicial capacity in any such matter. Mr. Lee, too, appears to have been quite oblivious of the evidence given by him in the years 1849 and 1850 in the appeals of the Phœnix Gas Company; and Mr. Anderson will, we presume, hasten to refund any reduction he may have obtained in his rates at Dover or elsewhere, in consequence of Dr. Leapingwell's previous decision, and will be content for the future to pay rates upon assessments to the full amount of the rents paid for the gas-works he leases. Justice, as well as charity, should begin at home.

We published in our last the balance-sheet of the Salford Gas-Works, and as many of its figures, when reduced so as to show the expenditure per ton of coal used and per 1000 feet of gas produced, present a very marked contrast to the speculative figures of Messrs. Lee and Penfold, we have tabulated them in the following form for facility of reference:—

Expenditure.				Per Ton of Cannel Carbonized.		Per 1000 Feet of Gas made.
Salaries—						
Manager	£350 0 0					
Chemist	50 0 0					
Treasurer	57 10 0					
Treasurer's clerk	70 0 0					
Office clerks	207 17 0					
		£	s. d.	£ s. d.		s. d.
		735	7 0	1 0·25		1·16
Inspectors		326	6 2	5·43		0·52
Collectors		339	0 7	5·65		0·54
Wages at works		3,275	14 11	4 6·54		5·17
Cannel		10,780	2 6	14 11·50	1	5·03
Retorts and setting		709	9 11	11·81		1·12
Lime		272	8 10	4·53		0·43
Wear and tear of works—						
Ironwork and castings	£42 2 10					
Repairing gasholder	8 3 1					
Repairs to implements	25 7 7					
Pumping water out of tank	25 2 6					
Oil, paint, and cement	23 10 3					
		124	6 3	2·07		0·19
Wear and tear of mains		249	1 10	4·15		0·39
Office and incidental expenses—						
Travelling expenses	£124 12 5					
General office ditto	26 3 3					
Printing, stationery, &c.	114 8 4					
Horse and cart hire	42 3 7					
		307	7 7	5·12		0·49
Local rates	£529 5 11					
Water-rate, &c.	95 13 0					
		624	18 11	10·40		0·99
Rent		175	11 4	2·92		0·28
Bad debts		394	11 8	6·57		0·62
		£18,314	7 6	£1 5 4·94	2	4·93
Products.						
Coke, tar, ammoniacal liquor, spent lime, and old iron		3,020	13 1	4 2·29		4·77
		£15,293	14 5	£1 1 2·65	2	0·16
Depreciation-fund		1,665	1 0	2 3·72		2·63
Interest at 5 per cent. on capital invested in works and mains		3,319	19 6	4 7·28		5·24
Income-tax		928	2 2	1 3·45		1·47
Net cost of gas		£21,206	17 1	£1 9 5·10	2	9·50
Receipts.						
Gas-rents (exclusive of meters)		28,963	4 7	2 0 2·25	3	9·72
Profit		£7,756	7 6	10 9·15	1	0·22

The meter question in Manchester, which has been so long and so acrimoniously agitated, has made rapid advances towards a settlement. The "battle of the spouts," as it has been facetiously called, has been fought and won by the champions of full measure. The investigation into the relative correctness of the meters of Mr. Crosley and of the other meter manufacturers remains to be prosecuted, but as regards the general principle on which the gas-meters for the town of Manchester are hereafter to be constructed, a complete victory has been gained. At the meeting of the City Council held on the 5th instant, the announcement was made that the gas committee had withdrawn an order given to Messrs. Parkinson for meters, in consequence of those gentlemen having declined to adopt the suggestions of the committee in respect of cutting down the spouts to the true water-level; and it was further announced that Mr. Cleminshaw, the manager of the gas-works, had tendered his resignation "on account of failing health." We should be sorry if that gentleman were compelled to resign by such a cause, but he has so committed himself to the adoption of high-spouted meters, and has exhibited such a strong partisan spirit in the discussion of the meter question, that his withdrawal from the influential position he holds cannot otherwise be regretted.

The gas committee of Manchester having thus recognized the principle of giving full measure to the gas consumers of that city, we trust that they will act up to it in their determination of the manner in which it is to be carried out. The proposed investigation of the relative degrees of correctness of competing meters is a step in the right direction, and if properly conducted it cannot fail to lead to important practical results. The committee have appointed Mr. Hawksley and Mr. Lowe to make experiments on the meters to be submitted to them by different makers, and those gentlemen, it is stated, are instructed to make the fullest and fairest inquiry into the whole subject, without any restraint. During the discussion in the gas committee an amendment was proposed, to the effect that the investigation should be conducted by three gentlemen instead of by two only, in order to obtain a casting voice in case any difference of opinion should arise, and certain points were specified whereon they should be required to report, the object of which was to ascertain the variations from the legal standard of the meters examined on the lowest water-line and on the highest, and with the smallest and the largest possible quantities of gas passing through them. Had that proposition been carried, a very satisfactory test would have been obtained of the relative correctness of the registration under all possible circumstances, and the meters which admitted the least varia-

tion would have been ascertained without dispute. Though the amendment was lost, the terms of it are recorded; and it is to be hoped that the gentlemen who are to conduct the experiments will attend to the points specified in their investigations and in their report.

Mr. F. C. Hills is mightily wroth at the notice in our last number of his patent oxide-of-iron process of purification, and in the violent outburst of his indignation he has forgotten orthography, grammar, and the usual amenities of correspondence. According to the custom of journalism in such cases, we should have thrown his angry effusion without further notice into the waste-paper basket; but we are inclined to stretch a point or two in favour of Mr. Hills, that he may find vent for the expression of his wrongs. We have corrected his orthography—with his grammar, we were afraid to interfere—and presuming that his hard words are meant only in a "Parliamentary sense," we have put his letter into print, instead of putting it into the fire. He is, in the first place, most anxious to state that the enlightened jury who at Guildford gave a verdict in his favour, were not Surrey farmers, but London merchants, and that some of them actually "understood chemistry." How far their knowledge of chemistry extends beyond compounding a bowl of punch or the slow combustion of a cigar, it might be invidious to inquire; and we are not disposed to pursue the inquiry further than may be agreeable. In the next place, Mr. Hills is anxious to deny that a rule for a new trial has been granted. On this point he seems to be strangely kept in ignorance, but if he will refer to the reports of proceedings in the Court of Exchequer on the 13th of November, he will find that a new trial was then ordered to take place, unless he can show good cause to the contrary. He ought to feel obliged to us for thus informing him how the case really stands, that he may be prepared with his reasons why not.

When Mr. Hills comes to speak of the validity of his patent and of the alleged discoveries of others, the overflow of his feelings mystifies his meaning so sadly that we can scarcely make it out; and he attributes expressions to us that are but the hallucinations of his own mind. The *value* of the oxide-of-iron process, we said, was admitted to be due to the discoveries of others; and unless Mr. Hills be prepared to deny the pre-existence of Mr. Laming's French patent, wherein the revivification of the spent oxide is specified, the whole vocabulary of Billingsgate would not gainsay it. With respect to the peculiar condition of the oxide of iron, which imparts value to it as a purifying agent—whether that condition be chemical or mechanical—it is a dispute between chemists with which we need not now interfere, more especially as Mr. Hills says he is prepared to settle it conclusively when the proper time arrives. Neither is it our business to examine the additional evidence with which Mr. Hills is provided "to satisfy the most incredulous," that he did not appropriate the process of revivification from Mr. Laming's experiments at the Westminster Gas-Works. If he can clear himself from the suspicions in that respect, excited by the evidence at the trial, he will do well, so far as regards his moral standing in society; but Mr. Laming's French patent, obtained some time previously, would still remain to establish the fact, that the process which gives value to the oxide of iron as a purifier was discovered before the date of Mr. Hills' specification.

After the conversation which took place at the last meeting of the Commissioners of Sewers respecting the inefficient manner in which a portion of the City of London has been lately supplied with gas, some notice will be expected from us relative to the crisis through which it is known the Great Central Company has just passed. We understand their contractors were disappointed in the delivery, at the proper time, of the materials required for the necessary repairs of a portion of the retorts, and that in the middle of December they officially announced to the board the probability of the supply of gas being partially interrupted. Six out of the twenty-two beds of retorts had been demolished to make room for an experiment on Mr. Clift's system of retorts, and the other sixteen beds were insufficient to meet the requisite nightly supply. In this emergency Mr. Wright, the engineer of the company, was authorized by the contractors to adopt every possible means to prevent the private and public lights from being extinguished, and his well-known skill and energy were taxed to the utmost to overcome the pressing difficulty. By the most strenuous and almost superhuman efforts, and by the adoption of various contrivances, he so far succeeded that all the lights have been supplied with gas by day and by night, though sometimes at a very low pressure. The Chairman of the Commissioners, who is also a director in another gas company, attributed the defective supply to difficulties arising from a combination among the workmen—and his company was, indeed, seriously inconvenienced some time since in that manner—but as regards the deficient supply in the City from the Great Central Company's works, we know that it was owing to the want of sufficient manufacturing power; and we may congratulate the directors that, under such critical circumstances, they have been enabled to keep faith with the public. There are conflicting statements as to the cause of the works being in so defective a condition at such a time, which we will not now discuss. The occurrence, from whatever cause it arose, affords an additional instance of the inconvenience and danger to which companies may be exposed when contracting for the supply of gas instead of manufacturing it for themselves. We have all along contended against the contracting system, which must be either a source of intermediate profit, wherein the shareholders ought to participate, or an onerous burthen which it is unjust to impose on individual contractors, and must end in dissatisfaction, litigation, and loss to all parties. The plan has been tried under the most favourable circumstances by the Great Central Company, with an active and intelligent directory, and with skilful, able, and enterprising contractors, but we apprehend the results have not been such as to induce other companies to follow that example.

Correspondence.

MR. HILLS' LAST WORD.

SIR,—Although it is scarcely worth my while noticing the attacks that are repeatedly made on me in your JOURNAL, yet I will refute some of the false statements made in your last number, but must take other steps if such attacks and insinuations are continued. With regard to your statement that the jury who gave a verdict that the purification of gas by hydrated oxide of iron, and its renovation belongs to me, were a jury of Surrey farmers, you must be aware is false. The gentlemen who composed that special jury were all, I believe, with the exception of one common juryman, London merchants of high standing, and some I have since heard understood chemistry. This can be proved, if necessary, by stating the names of the gentlemen who composed the jury; and therefore your attempt, by making such false statements, to injure me by imposing on those of your readers who do not know the real facts, is one of which you ought to be ashamed. Your statement that a rule for a new trial has been granted is equally false with the statement that the jury were a jury of Surrey farmers. No such rule has been granted. Your statement that I have to maintain the validity of my patent which is admitted to be due to the discoveries of others, involves a direct falsehood, as no such thing is admitted by me at all, and the insinuation is in direct contradiction to the verdict of the jury, who were five days investigating all particulars and the claims of all parties. The statement that hydrated oxide becomes anhydrous during the process of revivification, and is in that state a more active purifying agent than the original hydrated oxide, is erroneous. No one stated this at the trial, and those who stated that anhydrous oxides would purify gas beneficially, and that their power of purifying depended more on their molecular arrangement than on their state of hydration, only showed their ignorance, as it can easily be proved, and will be when the time for it comes, that no anhydrous oxide of iron will purify gas beneficially. As to your insinuation, so often repeated in your JOURNAL, that I learned my process of purification and renovation from Mr. Laming or Mr. Evans, I can but simply deny it; and it is against common sense to suppose that they would let me know what they were doing when they intended to take a patent for it themselves. I have also Mr. Gore's evidence on this point, which it was unfortunate for me did not arrive from Valparaiso (where I had sent a commission to obtain it) in time for the late trial. Mr. Gore, who was deputy manager of the Westminster Gas-Works under Mr. Evans, informs me that he had received instructions not to let me or my brother see or know any of Mr. Evans's or Mr. Laming's experiments at the gas-works in 1849, and I now add his testimony to this effect, given on oath and filed in the records of the court, and which would have come out at the trial had I received it in time. I make the following extracts from his evidence:—"I was in the employ of the Chartered Gas Company, as deputy superintendent of the works at Horseferry Road, in 1849. The said R. Laming did, during the months of May, June, and July, in the year 1849, make experiments in purifying gas at the works of the Chartered Gas Company in Horseferry Road, Westminster. To the best of my knowledge, *all* such experiments had reference to the extraction of *ammonia* from the gas. I was well acquainted with the nature and particulars of all the experiments made." To the ninth interrogatory he saith, "I did receive instructions from Frederick John Evans not to furnish any information to Mr. F. C. Hills or his brother on the subject of Laming's experiments, nor to

permit them to see either the material employed in these experiments or the residuum thereof, and to the best of my knowledge and belief such instructions were complied with by the workmen under me, to whom I communicated them also." He also says in the eighth cross-interrogatory, "I do not believe the Mr. Hills could have known of the experiments, as I took every precaution in my power to prevent their becoming acquainted with what was going on in the works." I think such evidence as this, coupled with the improbability of my being allowed to see or know the result of experiments for which a patent was intended to be obtained, should satisfy the most incredulous that I gained no information from any experiments tried at the Westminster Gas-Works.

In conclusion, I have only to say that if other inventions are the same as mine, why are they not used? Let every one have the benefit of his own. Messrs. Croll or Laming, or any one else, may, and always might have used the processes they have patented, and I should never complain, but they well know that they are worthless, and cannot be used; but because I have succeeded in producing a process that will answer, every endeavour is made to deprive me of the benefit of it by almost any means.

Chemical Works, Deptford, F. C. Hills.
Jan. 14, 1859.

CARBONIC ACID IN GAS.

Sir,—I think, with all due deference to your superior judgment, it would have been more politic for you to have assured yourself of the effect produced by any attempt to purify gas from the small quantity of carbonic acid it sometimes contains, before alluding to the matter in the way you have done in your Journal of the 21st ulto., under the head of "Circular to Gas Companies," and blindly adopting Mr. Lewis Thompson's exaggerated notions thereon. I grant you that carbonic acid does slightly deteriorate the illuminating power of gas, but I invite you to try the experiment of adding a small quantity, say one-half or three-quarters per cent. of this impurity to gas purified by means of lime, and hence containing no appreciable quantity, and you will soon find that any attempt to extract it subsequently will cause a diminution in illuminating power greatly superior to the effect produced by the half or three-quarters per cent. of carbonic acid. The fact is, the hydrocarbon vapours upon which the luminosity of coal gas chiefly depend must be handled very tenderly, or they may be precipitated.

You are also decidedly wrong in a sanitary point of view. Take two gases of *equal illuminating* power, one of which shall contain no carbonic acid, and the other containing one per cent. The combustion of the latter yields absolutely *less* carbonic acid than the former, paradoxical as it may appear. Chemicus.

TAUNTON *VERSUS* CROSLEY.

Sir,—I see by the report of the proceedings of the Manchester City Council on Wednesday last that Mr. Alderman Clark commented upon Mr. Rumney's statement at the previous meeting—that the meter submitted to Mr. Taunton was, as he (Mr. Rumney) had satisfied himself by our stock-book, &c., in London, "taken out of the stock;" and Mr. Clark further said that there was a letter from myself confirming the assertion of Mr. Taunton, attempting thereby to impugn the accuracy of Mr. Rumney's statements. Now, sir, the facts are—we have several modifications of meters which we *keep in stock*, and Mr. Rumney was perfectly correct in the statements he made on this subject. The meter in question was made in February, 1857—at least sixteen months before the date of Mr. Taunton's application. I deny that it was made for experimental purposes, or for him, as he implies, but was, as I stated in my letter to the gas committee on the 15th ult., one of "a class we construct to provide against certain frauds," and is intended for commercial use as a measuring instrument between buyer and seller, although containing more precautions against fraudulent tampering than some others.

Similar meters were sold by us as long ago as October and November, 1856, for registering the gas used by consumers in the ordinary way; and we are given to understand that they are still at work and are giving satisfaction, notwithstanding what Mr. Taunton says.

With regard to the erroneous registration which he *professes* to have found it to give (he does not venture to say whether fast or slow), I need only refer to the reports already published in your Journal—in the proceedings of the Manchester Council at the beginning of December, from those who examined and tested the meter after it was returned by Mr. Taunton (and which meter is still under the seals that were put upon it during my absence by disinterested parties the instant it arrived from him)—to prove the utter fallacy of that statement.

The reckless assertion he has made about its having been manufactured in the interval between the order and delivery to him, although bearing a badge of a previous year, is not entitled to one atom more credit. The fact is, that his statements are so totally devoid of truth, that I think it waste of time to dwell longer upon them, or give them an importance they do not deserve.

William Crosley.

Gas-Meter Works, 103, *Southwark Bridge Road,*
London, Jan. 10, 1859.

GAS-METER TESTING.

Sir,—The question respecting gas-meters, now agitated in this county, is giving so much trouble by raising doubts as to their correctness, that I should be glad to see it thoroughly investigated and set at rest at once. To do this, it will be necessary to guard against every possible source of fallacy in the experiments; yet one fallacy, I think, occurs in most of the experiments hitherto published—I mean, trying one meter by means of another.

A meter of the ordinary make has been tested, found correct, and then used to try others under very different circumstances to those under which it was tested. Now, it is easily demonstrated that a meter of the common construction which is correct when working with so small a quantity of gas passing as to cause a pressure of only 1/10th of an inch to work it, cannot be correct when working with a friction causing 6/10ths pressure, because the water in the inlet (or measuring) chamber is depressed, and the capacity of the chamber thereby enlarged. A fairer method of trial would be to use a gasholder of, say 200 feet capacity in every experiment. Let this gasholder be filled until gas escaped at a gauge for the purpose, and then emptied through each meter to be tried, and each experiment at a different velocity of discharge. The index of each meter would show the quantity registered under the various conditions of trial, and would be a fair comparative test. The gasholder would require no great accuracy of dimensions, so long as it was perfectly gas-tight, as its full contents would pass through every meter; and, if care be taken with the temperature, or allowance made for any variation therein, the same quantity must pass through each.

Other and better means will probably suggest themselves to the parties who have been or may be appointed to test the accuracy of the various meters submitted to them, but I think it the duty of every gas manager to give all the assistance in his power, and therefore trouble you with this letter.

A Lancashire Gas Manager.

Register of New Patents.

1460.—Benjamin Young and Peter Brown, of Spa Road, Bermondsey, in the borough of Southwark, glue manufacturers, for "*An improved method of collecting and disposing of the sewerage of towns and cities.*" Patent dated June 28, 1858.

This invention has for its object more particularly to collect and dispose of the sewerage of London and its environs, and, by preventing the solid matters contained in the sewerage from passing into the Thames, the river will be purified, and at the same time the said solid matters may be collected and used as a manure for fertilizing land.

In order to effect this object, it is proposed to lay a sewer or drain constructed of cast-iron pipes, brickwork, or other convenient or suitable materials, along the banks of the river, at a convenient distance between low and high water-mark. This sewer or drain, it is preferred, should be constructed of cast-iron pipes or tubes, which must be of considerable sectional area, to be computed according to the quantity of sewerage expected to be carried through it in a given time. These pipes or tubes are to be sunk in the solid ground, which must be excavated for the purpose; and all the land drains and sewers must be made to communicate with the main sewer or drain so formed. This main drain or sewer may, if desired, be enclosed within an embankment extending from the present line of shore to any distance that may be considered necessary; and manholes or openings must be made in the pipes at suitable distances, for the convenience of obtaining access when required to the sewer. This embankment may be used either as additional wharfage accommodation where required, or as a promenade or carriage-way along the side of the river; or, if preferred, the carriage-way may be raised up on columns or arches on the embankment, and the spaces beneath may be used as warehouses or for other purposes. These large main sewers or drains which are intended to receive the sewerage from the land drains, are to be made to empty themselves into pumps, from which the sewerage is to be pumped or lifted into large tanks or reservoirs situated at a distance from the town. These reservoirs must be covered over, and converted into close chambers, in which, when filled, the liquid is to remain at rest for a suitable time, in order to allow the solid matters to settle to the bottom; or, instead of the large main drains or sewers being made to empty themselves into pumps from which the sewerage is afterwards pumped into reservoirs as above mentioned, force-pumps may be adapted direct to the large iron pipes or tubes with which the sewer is constructed, and by this means the sewerage will be pumped at once into the reservoirs.

While the sewerage is thus settling and depositing its solid matters at the bottom of the reservoir, the liquid will give off many noxious vapours, such as sulphuretted hydrogen and other gases, which are to be collected and drawn out of the reservoirs by means of an artificial draught induced by fans, blowers, high chimneys, or other convenient and suitable exhausting apparatus, and the noxious vapours so collected are conducted to a furnace or furnaces, and are passed through the fires, where they will be consumed, or the deleterious gases removed or burned out of them.

After the sewerage has been allowed to remain at rest for from six to ten days, the supernatant liquid is allowed to run off at the high level to which it has been lifted by the pumps, and it will be carried through suitable pipes to some outfall, and if desired it may be conveyed to the sea. But it has been proved by experiment that the supernatant liquid, after being allowed to remain at rest for some days, will be perfectly tasteless, and as brilliant and clear as the best spring water; this liquid may therefore, without the slightest inconvenience, be allowed to run direct into the Thames or other river.

When the deposit of solid matter in the tanks or reservoirs has attained a certain thickness or depth, it must be deodorized, and the tanks cleaned out from time to time, for which purpose a sufficient number of tanks

must be constructed. For the purpose of deodorizing these solid matters it is preferred to use peat charcoal, but the patentees do not intend to confine themselves to this or any other deodorizer, and they would simply observe that as it is proposed to use the solid matters as manure, it is advisable not to make use of any chemical ingredient as a deodorizer, which will injuriously affect the fertilizing principle of the manure. It will be understood that by thus collecting the sewerage in the sewers or drains that are not affected by the tides, there will always be a regular flow of the liquid towards the tanks, as the pumps and lifting-engines are to be kept constantly at work. There will, consequently, be little risk of the main or other drains becoming choked or clogged by any deposit of solid matters therein.

The artificial draught caused by the ventilating fans or high chimneys will always create a current of air in one direction in the land drains, as well as in the main drain or sewer, and consequently no smell will emanate from the traps or gully-holes, either of private houses or public streets or ways, as now is the case at certain seasons and times of the tides.

Having described the nature of their invention of "an improved method of collecting and disposing of the sewerage of towns or cities," and having explained the manner of carrying the same into effect, the patentees observe that inasmuch as the construction and arrangement of the necessary apparatus for carrying out and effecting the object of the invention must necessarily depend upon local circumstances, which must be judged of by the engineer employed in erecting or constructing the works, they have not considered it requisite to give any drawings thereof, as the principle upon which their improved method of collecting and disposing of the sewerage of towns or cities is based, is sufficiently explained in the above description of their invention.

The claim is for collecting the sewerage of towns or cities in close tanks or reservoirs, in which it is allowed to remain at rest for a sufficient length of time to enable all the solid matters contained therein to settle and be deposited at the bottom of the said tanks or reservoirs, from which the clear supernatant liquid is afterwards drawn or allowed to run off in order to admit of the said tanks or reservoirs being again filled from time to time at regular or stated intervals, so as to obtain an accumulation of the solid matter in the said tanks or reservoirs.

The patentees claim principally the use of closed or covered tanks or reservoirs for the above purpose, so as to admit of the noxious or deleterious fumes or gases arising from the stagnant sewerage being collected and drawn off by any convenient exhausting apparatus, whereby such noxious or deleterious fumes or gases may be conveyed to furnaces or fire-places, in which they may be consumed or purified before being allowed to escape into the atmosphere.

1496.—Carl Buhring, of Great College Street, Camden Town, London, for "*Improvements for filtering liquids and other fluids containing impurities.*" Provisional protection only granted. July 3, 1858.

The object of this invention is to filter liquids and other fluids containing impurities from the surface or from near the surface thereof, and in order that matters of greater specific gravity than the liquids or fluids may be allowed to precipitate themselves to the bottom of the containing-vessel, so that when the liquids or other fluids are passed from the said vessel through the filter the latter may have to take up and retain no more than is necessary of the solid matters contained in the liquids or other fluids. The filters will thus be kept efficient without cleansing or removal as long as it is possible, in consequence of the grosser impurities not having been precipitated upon the filtering medium.

The invention consists in employing, for the purpose set forth, a charcoal porous stone, or any other suitable filtering medium of any kind whatever, arranged to float upon the liquids or other fluids to be filtered, or to be supported at or near the surface thereof in any other suitable manner, so that, should the level of the liquids or other fluids change or be changed, the position of the said filtering medium may similarly vary its position, or be similarly varied in position, in order that the said liquids or other fluids may be always drawn through the filtering medium from, or nearly from, the surface. A pump, syphon, or other suitable instrument or apparatus for drawing or otherwise passing the liquids or fluids up through the filtering medium.

In carrying this invention into effect, a block of wood is sometimes employed, with intersecting holes or passages bored through it horizontally, and plugged at their extremities; and from the intersections of these holes or passages other holes or passages are bored through the under-side or bottom of the block, and have screwed into them tubes, upon the lower ends of which moulded balls of carbon are screwed. The intersecting holes or passages are all connected with a single hole or passage in the side or top of the block of wood, and to this hole or passage the suction-pipe of a pump, or the suction-leg of a syphon, is attached. The action of this apparatus needs no description.

The inventor does not confine himself to the apparatus just described, as many other forms of apparatus may be readily devised for carrying this invention into effect.

1499.—John Chisholm, of Bermondsey, in the co. of Surrey, manufacturing chemist, for "*A method of disinfecting and deodorizing or treating sewerage and other matters, and structures, and places.*" Patent dated July 3, 1858.

According to one arrangement, which the patentee terms his sewerage-battery, he submerges in the fecal matters, and at certain distances from one another, two plates of electrically opposite metals or materials, as, for example, a copper and a zinc plate, which is conected by conducting-wires, one proceeding from each, and meeting at a point where they are soldered together. These wires are insulated by a coating of gutta-percha, or other insulating material, up to their point of mutual junction, where the insulating coating ceases, so as to set free the electric current which will be generated by the action of the fecal fluids on the positive and negative plates, and allow it to act on the fecal matters, in order to deodorize and disinfect them.

The following is a brief description of the arrangement he employs for disinfecting the vitiated atmosphere of theatres and other crowded and heated structures and places:—In a hole at the side of the building a zinc plate is sunk, and surrounded with bone-ash; an insulated wire is led from this plate, carried into the building, and soldered to the end of an insulated wire proceeding from a copper plate sunk in another aperture. At the junction of the wires, where there must be no insulating coating, they are brought into contact with and disinfect the currents of air within the structure.

The claim is for—

1. Treating sewerage or other noxious or infected matters in a fluid, semi-fluid, aëriform or solid state, by electric or galvanic agency, in order to deodorize and disinfect them, and obtain innoxious and useful products therefrom.

2. For the combination, adaptation, and application of means with, in, and to structures and places containing noxious and infected gases and other matters, in such manner as, and in order to effect the application of electric or galvanic agency to their contents, for the purpose of disinfecting and deodorizing them.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED INVENTIONS.

2900.—James M'Kenzie, manager to William Strode, of St. Martin's-le-Grand, London, gas engineer, for "*Improvements in those gas-burners known as ventilating sun burners.*" Dec. 18, 1858.

2936.—John Whitelaw, of Dunfermline, N.B., ironfounder, for "*Improvements in sewerage and drainage apparatus.*" Dec. 23, 1858.

2952.—William Beckett Johnson, manager for Messrs. Ormerod and Son, of Manchester, engineers, for "*Improvements in the employment of gas for generating steam, and in engines connected therewith.*" Dec. 24, 1858.

2983.—Francis Puls, chemist, of Roxburgh Terrace, Haverstock Hill, London, for "*The treatment of hydro-carbons.*" Dec. 30, 1858.

2987.—Thomas Bell, of Plaistow, Essex, for "*Improvements in purifying gas.*" Dec. 30, 1858.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED INVENTIONS.

1935.—Samuel Newman Rodier, of 21, Oak Village, St. Pancras, London, for "*Improvements in apparatus for regulating gas.*" Aug. 26, 1858.

1943.—Herbert William Hart, of 69, Fleet Street, gas engineer, for "*Improvements in the application of gas to chandeliers.*" Aug. 27, 1858.

1991.—Samuel Laing, of Millwall, engineer, for "*Improvements in the apparatus employed in the manufacture of gas.*" Sept. 1, 1858.

2020.—James Fyfe, of Greenock, N.B., brassfounder, for "*Improvements in stop-cocks or valves.*" Sept. 7, 1858.

2312.—Joseph Pierre Gillard, of Paris, civil engineer, for "*Improvements in generating hydrogen, and in the means of and apparatus for applying the same to lighting and heating purposes.*" Oct. 16, 1858.

2839.—George Ferguson Wilson, of Belmont, Vauxhall, London, for "*Improvements in the manufacture of lubricating oils.*" Dec. 10, 1858.

Legal Intelligence.

VICE-CHANCELLOR'S COURT.

TUESDAY, JAN. 11, 1859.

(*Before Vice-Chancellor Sir* JOHN STUART.)

CLARK *v.* THE VESTRY OF THE PARISH OF PADDINGTON.

This was a bill praying that the defendants might be restrained by injunction from demolishing, destroying, altering, or injuring twelve houses erected by the plaintiff in Spencer Street, in the parish of Paddington, or any of them, or the drains laid therefrom, or any of them, and from in any manner interfering with or preventing the completion of the said houses or buildings, or any of them. The plaintiff is the owner of a piece of land near the Harrow Road, in the parish of Paddington, which he had formed into three streets, lying nearly parallel to each other, and called respectively Delamere Terrace, Spencer Street, and Cirencester Street. In September, 1856, the plaintiff, being about to commence building the houses in Cirencester Street, which was the most southern of the three streets, and being then under an impression that, according to the provisions of the Metropolis Local Management Act, the sewers necessary for draining the said three intended streets would have to be constructed by him, and at his expense, instead of by the parish, and at their expense, constructed a sewer according to a plan prepared by the defendants' surveyor, connecting the sewer in Cirencester Street with the main sewer from Hampstead on the east. In August, 1857, the plaintiff, being desirous of building the houses in Spencer Street, wrote to the vestry-clerk of the defendants, and requested to be informed how the houses about to be built by him were to be drained. The defendants' clerk, in reply, said that the defendants expected the plaintiff to continue the sewer from its junction in Cirencester Street. The plaintiff's solicitor then wrote, in reply, that the duty of constructing sewers was vested in the vestry, and not in the owners and occupiers of the land. The defendants, however, refused to construct such sewer, and issued an order forbidding him to erect any houses in Spencer Street until he had completed the sewer in accordance with their plan, and adding that the vestry had power to demolish any building erected contrary to their order. After some correspondence, this bill was then filed. By consent a motion for an injunction in the terms above stated, which had stood over since the 20th of November last, when an *interim* order for an injunction was made, was treated as a motion for a decree.

Mr. Bacon and Mr. D. Lewis were for the plaintiff, and Mr. Malins and Mr. W. D. Evans for the defendants.

The Vice-Chancellor, in delivering judgment, said:—The plaintiff was called upon by the defendants to make a communication between a sewer in Spencer Street and a larger sewer which runs along the Harrow Road. The defendants, the vestry of the parish, insisted that the plaintiff was bound to make that communication; nay, more—upon the 4th of November last the plaintiff had a formal communication made to him, in the shape of an order, by the vestry of Paddington, which directed or ordered him to discontinue the erection of twelve houses until he had made this communication with the sewer in the Harrow Road. Not only did they order him to discontinue his building, but this order was accompanied with a threat, that if he proceeded with the building, contrary to the order, the vestry had power to cause the building to be demolished, and to recover from him the expense caused by that demolition. It is now admitted on behalf of the defendants that the vestry had no power whatever to compel the plaintiff to make this communication between these two sewers. That is admitted, and very properly admitted; but it is said that filing the bill was unnecessary; the vestry were under a misapprehension, but that the plaintiff was under a misapprehension, too, that he was to receive any damage or injury whatever.

I consider that the vestry of this parish, who, like many other vestries, are armed by the Legislature with very large and arbitrary powers, which they are to exercise for purposes beneficial to the public, should come forward and treat as a light matter—as a thing to be disregarded—any formal order made by themselves, is a very great mistake; but it is a still greater and more serious mistake for a public body like the vestry of Paddington, armed with these enormous powers, to demolish buildings in order to have certain public purposes executed—that they should inconsiderately, and without being quite sure of the grounds on which they are proceeding, make an order of this kind at all. And it is impossible for a public body of this kind, who appear in a court of justice, where they are brought in consequence of an order made by them, should first of all begin by saying that their order was made under a misapprehension. The order was one in plain terms—a serious threat, and a threat which it was impossible not to see is accompanied with injury; because a public body, armed with these powers, ordering a man to discontinue building, which implies discharging workmen and other matters that may be a great and serious pecuniary injury, as well as injurious in other respects to the parties,—that a vestry proceeding in that way must be prepared to justify their conduct. They do not attempt to justify it at all, but they retort—No, the plaintiff ought not to have come into this court after receiving so serious an order. The plaintiff, I think, proceeded with no undue precipitation. He did what every wise and sensible man would have done under such circumstances. This order is communicated to him on the 4th of November. He consults his solicitor, and on the 6th of November the solicitor writes to the vestry-clerk of this parish, and asks whether it is really intended to act on the order, and says, if he hears no notice to the contrary within four days, that he shall take it for granted that they do intend. The plaintiff was in no degree bound to give such an intimation, and he would have been perfectly justified, the day after receiving that communication on the 4th of November, which announced an order so seriously affecting his interests, at once in asking the protection of the court, and in having the adjudication of the court on the merits of the dispute between himself and this public body. There has been, therefore, no precipitation on the part of the plaintiff; but it is said there was to be no vestry meeting before the 10th, and that the plaintiff, who was a parishioner, ought to have known the days of the vestry meetings. The vestry, as a public body, mostly acts through their public officer. Their public officer is their clerk, who communicated this formal order. The vestry-clerk is the person addressed by the solicitors of the plaintiff, and his duty would have been to communicate to the plaintiff that there was to have been no vestry meeting before the 10th; that he, therefore, could have no answer before the 10th; in the meantime giving, as he thought fit, some assurance that his alarm was unnecessary, and something to prevent his seeking that protection to which, in my opinion, he was most justly entitled. Here is a case, therefore, in which this public body, armed with these powers, has exercised them in a way which it is admitted was improper. It was an exercise of them under a misapprehension of their right, and one that can no longer be insisted upon. The case is one in which that undertaking which very properly the vestry have given, must be turned into an order for a perpetual injunction, to restrain them in the terms of the prayer of the bill from demolishing the plaintiff's houses, or from interfering as they have now interfered to discontinue to erect them. I think this is due to this public body, which is represented here by their solicitor and not by their parish clerk, that as soon as the solicitor in this cause was consulted on behalf of the defendants, he, as might be expected, saw that the vestry had been ill-advised, and therefore has not attempted to defend here a course of conduct which in itself is indefensible. The plaintiff succeeds in getting that relief for which he prays, and like every successful plaintiff ought to get the costs, and I must direct that the defendant pay the plaintiff his costs, but I cannot in this case, any more than in a previous case of the same kind, help adverting to this circumstance, that the plaintiff is himself a parishioner of this parish, that the costs of this litigation, which have been improperly caused by the unjustifiable act of this public body, who seem not to know what their powers are, except that they are determined to exercise to the utmost, whenever they see an opportunity, the powers which the Legislature has conferred on them—that the order that I now make that the defendants, the vestry, shall pay the costs, is to be enforced by levying a rate on the parish to which this plaintiff himself must contribute a proportion. That is a shocking injustice, and one which I hope the Legislature will provide means of remedying; for it cannot be consistent with justice that persons exercising public functions, and exercising them recklessly, and by mistake of their conduct, that they should make the injured person bear his proportion of the very costs of his seeking that remedy to which they compel him to resort in order to have protection. All I can do now is to order the parish to pay the costs, and to express my regret that the plaintiff himself must contribute some portion of those costs to which he is justly entitled.

Mr. MALINS: Take a decree for a perpetual injunction as prayed by the bill.

The VICE-CHANCELLOR: Yes; I hope this will be a lesson for other vestries.

COURT OF QUEEN'S BENCH.

WESTMINSTER, WEDNESDAY, JAN. 12.

(*Sittings in Banco, before Lord* CAMPBELL *and Justices* WIGHTMAN, CROMPTON, *and* HILL.)

THE QUEEN *v.* THE BURSLEM BOARD OF HEALTH.

Mr. LUSH, Q.C., moved for a rule calling upon the Burslem Board of Health to show cause why the return made by the board to a *mandamus* should not be quashed. The *mandamus* commanded the board to make compensation to the prosecutor for injuries which he had sustained by reason of a sewer constructed by the board under his property, and the return made set forth the same facts as had been relied upon by the board in showing cause against the rule for the *mandamus*—viz., that no demand for compensation had been made, and that the board had never disputed their liability. The court had decided all those objections when they made the rule absolute for the *mandamus*, and the learned counsel contended it was not competent for the board to raise the same objections in a return

Lord CAMPBELL: They ought either to obey the writ or show some reason why they do not obey it.

Mr. LUSH: The return only showed reasons why the writ ought not to have issued. It was usual in a *mandamus* to allege a demand and refusal, but those allegations were not traversable, having been already determined by the court.

Lord CAMPBELL said that any material allegation would be traversable, and he would have been willing to accede to the application to quash the return if the decision could have been reviewed, but, as that was not the case, the objection must be taken by demurrer to the return.

Rule refused.

SURREY SESSIONS.

TUESDAY, JAN. 11.

CHARGE OF STEALING GAS.

John Knapp, a master butcher of Russell Street, Rotherhithe, surrendered to take his trial for stealing 100 feet of gas, the property of the Surrey Consumers' Gas Company.

It appeared that the defendant had for some time been a customer to the prosecutors, and he was indebted to them in the sum of £1. 5s. 3d. up to Michaelmas last. Mr. M'Glashan, the collector, having called several times for the amount without success, took away the meter and capped the service-pipe on the 8th of December. On the 14th it was discovered that the consumer's pipe had been fixed to the company's pipe without their knowledge, and a quantity of gas was thus surreptitiously burnt.

Mr. *Schomberg*, chief inspector to the company, said that on the 15th and 16th of December he went to the defendant's house, and found the gas burning without a meter.

Henry Causey, foreman to the company, confirmed the last evidence, and added that he saw the defendant in the shop while the gas was being burnt, and on the 17th witness cut off the service-pipe in the street.

James Rothery, clerk in the company's employ, said he served notice on the defendant on the 4th of December, informing him that unless he paid for the gas on the 8th, it would be cut off.

Mr. THOMPSON then addressed the jury at length, contending that the defendant had no intention to steal the gas or misappropriate it in "*malice propense*." In fact, he was rather exasperated at having it cut off, and in a moment of passion he put on an old pipe and lighted it. He then found, to his dismay, that he could not turn it off, and he expressed his willingness to pay any amount of damages the gas company might claim.

Evidence having been given as to the defendant's respectability, the jury returned a verdict of "Not guilty."

WEST KENT QUARTER SESSIONS.

THURSDAY, JAN. 6.

(*Before the Earl of* ROMNEY, *chairman, and a Bench of Magistrates.*)

CHEFFINS *v.* WOOLWICH LOCAL BOARD OF HEALTH.

This was an appeal against a general district rate made by the Woolwich Local Board of Health last October.

Mr. BRIDGE appeared for the appellant, and the Hon. G. DENMAN for the respondents.

The plaintiff is an owner of property in North Woolwich, and appealed against the rate mainly on the ground that the estimate contained an item of £304 for the payment of principal and interest on account of drainage works carried out in South Woolwich, which, being in the nature of permanent works, and exclusively for the benefit of the southern portion of the district, ought to be paid for by a rate levied on that part of the district only. The 86th sect. of the Public Health Act enacts, that whenever expenses are incurred by a local board of health for works of a "permanent" nature, for "the benefit of a district, or for any part of a district," the local board shall levy "a special district rate" for the payment of the same.

Mr. DENMAN argued that it was not incumbent on any local board to subdivide a district, and where that had not been done the rate for any works required must be levied upon the district generally, as in the present instance.

For the appellant it was contended that, by the 89th section of the said Act, local boards were bound to separate a district when situated as in this case, and to levy special district rates only on that portion which became benefited by any works of a permanent character that it might be necessary to execute.

Mr. BARNET, the surveyor to the board, admitted that the drainage works were entirely limited to South Woolwich, and that the roads in North Woolwich were in a very bad state (not having been dedicated) and the lighting inefficient.

The Court, being of opinion that no assessment should have been made on North Woolwich for works from which they derived no benefit, quashed the rate.

GREENWICH POLICE COURT.

THURSDAY, JANUARY 6.

(*Before Mr.* TRAIL.)

EMBEZZLEMENT BY A GAS COMPANY'S COLLECTOR.

John Hunt was brought up on remand, charged with embezzling money, the property of the Surrey Gas Consumers' Company.

Mr. SOLOMONS appeared for the prosecution, and Mr. HALL defended the prisoner.

Mr. *Frederick Cooper*, clerk to Mr. Lawes, patent manure manufacturer, produced a receipt for £7. 19s. 6d., given him by the prisoner on the 15th of December for a quarter's gas supplied by the company at the works of Mr. Lawes.

Mr. *R. J. P. Bentley*, carpenter, of New Cross, produced a receipt for £1. 8s. 6d., and the counterfoil of that receipt bore the same number as that produced by Mr. Cooper, and the theory of the prosecution was that the prisoner had made the smaller sum represent the greater, and embezzled the difference.

Evidence was then given of the following sums being paid to the prisoner, whose receipts were produced:—Mrs. Green, Evelyn Street, Deptford, £1. 0s. 9d., on the 6th of December; Mr. Henry Newton, Broadway, £12. 0s. 9d., on the 29th of November; Mr. J. Manktellow, of Deptford, 3s. 6d., on the 29th of November; Mr. Miller, coffee-house keeper, Deptford, £12. 5s. 3d., on the 15th of November; the Warehousemen and Clerks' School, New Cross, £2. 4s. 9d., on the 13th of November.

Mr. *Nottage*, clerk to the company, proved that the prisoner absented himself on the 22nd of December last, without giving notice, and was absent until he was apprehended on the 28th of that month. His duty was to pay into the London and County Bank, at Deptford, all moneys received by him, and to enter in a cash-book at the office every amount he received. This book was produced in court, and the receipt which had been produced by Mr. Cooper was compared with it, when the entry appeared in the name of Bentley, of £1s. 5s. 9d., but no entry appeared of the £7. 19s. 6d. paid by Mr. Cooper. Other accounts were tested in a similar manner.

Detective-officer *Knight* stated that he found the prisoner in a public-house in Carthusian Street, and waited till he came out. When he got into the street he told him the charge, and he denied having ever lived at Deptford, or that he was connected with the gas company. Witness took him to the Greenwich station, when he admitted that he was the man described in the warrant.

Mr. SOLOMONS applied for a further remand, which was granted, bail being consented to—the prisoner in £200, and two sureties in £100 each.

On Thursday last the prisoner was brought up and committed for trial. No bail was offered.

CAMBRIDGE ADJOURNED BOROUGH SESSIONS.

SATURDAY, JAN. 8.

(*Before* R. M. NEWTON, *Esq.—Recorder.*)

THE CAMBRIDGE GASLIGHT COMPANY, *Appellants*; THE GUARDIANS OF THE CAMBRIDGE UNION, *Respondents.*

This was an appeal by the company against a valuation of their property by the guardians made in August last under the provisions of the Cambridge Award Act. At the sessions in January, 1857, the former valuation by the guardians was reduced from £1658 to £492. 18s., subject to a case to be submitted to the Court of Queen's Bench. That case, however, was never argued, and in August last the guardians resolved to abandon it, and proceed to a fresh valuation. The net rateable value of the company's property was then assessed by Messrs. Lee and Penfold at £2542, and against this valuation the company now appealed.

Mr. O'MALLEY, Q.C., Mr. KEENE, and Mr. J. H. MILLS appeared for the appellants; and Mr. PASHLEY, Q.C., Serjeant TOZER, and Mr. ORRIDGE for the respondents.

There were appeals by the company against the rating in the several parishes of the union, and the one in reference to the parish of St. Andrew-the-Less was entered first. When it was called on—

Mr. PASHLEY applied that the appeal against the whole valuation might be taken first.

Mr. O'MALLEY opposed the application, offering to try the merits of the case on the appeal in one parish.

After a lengthened argument, the court decided that the question of the whole valuation should be first proceeded with.

Mr. PASHLEY then submitted that the court had no jurisdiction, the appellants not having appealed to "the next practicable session" after the making of the valuation.

This motion gave rise to much discussion. Ultimately—

The RECORDER ruled that he had jurisdiction to try the case.

Mr. PASHLEY said, in the event of its becoming material, he must ask the court to grant him leave to apply to the Queen's Bench upon this point.

The RECORDER said he was most anxious to save expense and litigation, and thought it would be better to wait until it did become material.

A lengthened conversation ensued upon the question of whether the appellants or respondents should commence, which was terminated by

The RECORDER, who said: This is a very peculiar case, and I think, under all circumstances, the respondents should begin.

Mr. PASHLEY then proceeded to open the case for the guardians. He said the point to be determined was the sum which this wealthy corporation—composed of persons who had invested their capital in the concern, were paying 8 per cent. upon their shares, and handing over a large sum to the Improvement Commissioners—were to be rated at. They were, it was clear, not to pay either more or less, in proportion to the real value of their property, than the small tradesmen—certainly not less than all their fellow-ratepayers in any of the townships. Unfortunately for the ratepayers, it was a much more difficult matter for the guardians and parish officers, in a concern like this, to ascertain the rateable value of immense property of this description. The property of a gas company being of various kinds, and extending as it did through several parishes, involved difficulties as to assessment very much like those which arose in reference to canals, railways, and water-works. He was sorry to say that in London water-works were questions of great difficulty, and were constantly giving rise to appeals. It was not possible to deal with them as houses, which were the natural subjects of rental, were dealt with, and where an actual rent was paid by the occupier to the landlord. That was the ordinary condition of things in England, the great bulk of people living in houses for which they paid a given rent. The every-day practice, therefore, was to take the gross rental as the basis of operation. If the landlord did the repairs, and the tenant paid a larger sum, part of which went in repairs of the property, they had to be deducted; and by taking that off and the insurance, a net sum was arrived at which, on a series of years, the landlord would get for his property. This net rent was the real rateable value of the property, unless, indeed, some small per centage was deducted for inappreciable depreciation. All this was very reasonable in the case of ordinary property, and he would not have begun his address by remarking upon it, had it not been for some observations which had been made on the other side in the course of the preliminary discussions that day. In the year of grace, 1859, one did not expect to hear it said that in estimating the rateable value you must take the rough material, and look only at the height of the chimney, the dimensions of the gasometer, &c., in order to ascertain what a reasonable man would give for the occupation. In reference to railways this could not be ascertained; but in the case of gas-works such persons as tenants were found. There were certain works in England in which it was judged better for a person to take them as lessee, and pay a rent for them. Now and then it had been done in the case of a line of railway; and by taking the rent so obtained you got at the approximate value of the property. But upon the whole, nobody could take it in that way; and if a man were about to take a lease of gas-works at Brighton or Cambridge, and were asked what he would give for it, he would inquire what was the cost of the coals used, what the quantity of gas made from them, &c. He would be told—"We have such and such a staff, we give so much for coals, &c., our outgoings are so much, we receive £10,000 a year, and there is a surplus of about £3000." "Is there any depreciation in the premises?" "No, we pay for all that out of our profits." Well, if the net returns were £3000, he might say: "I must have £500 or £800 a year for my own trouble, and therefore I can afford to give £2500 a year rental for the concern. I can take it as a tenant, and pay that rent for it, and get a revenue out of it for myself." It was just the same as a farmer who is asked what he will give for a farm. He said to himself, "This is good wheat land; I can afford to give £300 a year for it, because I shall make £600, and the £300 will be an abundant return for the capital I shall invest in the farm." In the case of gas-works there was not a large amount of capital wanted when the works were let, because the gas-rents were paid on short credit, generally once a quarter, and the lessee paid for his coals in the same way, and therefore it was not like a large railway in which there was a considerable amount required for rolling stock. Now, it was quite true that the tenant was not to be assessed to the poor-rate on the profits which he made by his occupation. He would dare to say that before an incompetent court—a court composed of gentlemen not accustomed to administer the law—it might be said by some counsel, "You are not to rate profits, and therefore cannot go into this inquiry." He (Mr. Pashley) said—You are not to rate profits, and therefore you must go into them, and get at the rent by seeing what is the whole amount of profit, and separating that from the sum which a tenant would give his landlord, see what is the net profit to rent. The rateable value and the net rent are the same things, and are ascertained after allowing for all the sums which are needed to maintain the property in a state to command that rent. Therefore, the gross rental being any given sum, if the landlord is to do the repairs, you must ascertain what the repairs amount to on an average, and say, "that sum which is to be paid in gross to the landlord is not the net rent; he gets it minus the sum which he is obliged to pay to keep the premises in repair." The question you have therefore to determine in this case is, "What is it worth while for a tenant to give this property year by year?" If this kind of property were generally held by tenants, there would be less difficulty in ascertaining that amount than there was now. But that was really the point to be arrived at, and the only question was as to the mode of arriving at it. He was extremely happy to believe that in the present case the great difficulty of apportioning the rateable amount amongst the various parishes would not arise. When there was a gasometer occupying a great deal of ground in one parish, a large number of pipes and a small number of lights in another, and a large number of lights and few mains in a third, questions of extreme difficulty arose, which questions had been very much complicated by the fact that the courts had had to interpret a statute passed in the 43rd Elizabeth, in 1603, when things of this sort were not contemplated, although probably if an enactment to meet the present state of matters were now to be discussed, corresponding difficulties might be experienced. He was not about to trouble the court by referring to cases, because any one of the cases which had been argued, and which were reported in Adolphus and Ellis, or Maule and Selwyn, respecting the assessment of these great concerns, would show the truth of what he had stated—viz., that the only mode in which the rateable value could be got at was by first taking the gross receipts, then getting at the expenses, and thus ascertaining the net receipts. There was, then, the other step to take, and it was the only other one necessary in this case—viz., having got the balance-sheet of net receipts, to determine what allowances should be made. Now that, in railway cases, was a very great difficulty, and gave rise to a great deal of discussion in order to ascertain, in certain cases, whether an allowance to be made to a tenant should be 12 or 15 per cent. in respect of the capital represented by the rolling stock; and it had been held by quarter sessions that he should have a certain sum, but that each particular case it should be dealt with in the discretion of the court, as to what sum should be allowed the tenant in the way of return for the capital employed and the skill bestowed. In working a great railway, where £500,000 or £1,000,000 of money was invested, the main question was, how much per cent. should be thus allowed? and whatever sum the tenant was allowed to go into his own pocket, must be excluded from the rate;—it was part of the whole sum which the property would realize. It was really, as it had always appeared to him, the same question in principle as that of the ordinary occupation of a farm—What sum will the tenant make of the farm altogether? What will be his profit in respect of the occupation? Divide that into two parts, and the proportion which he paid to his landlord in the shape of rent was the rateable value, if the tenant did the repairs. That was the principle which ran through all the cases, and that was the sum which the court had to get at in this case. The whole question was—What is the property worth to let? It was in the occupation of the company, and, supposing that a month before this rate was made they had put an advertisement in the newspapers to the effect that they were willing to let the whole concern to a tenant, and there was no doubt that such things were not infrequently let to tenants—in fact, some such gentlemen would be brought forward on this occasion—gentlemen who were lessees of such concerns, and who had taken them with a knowledge of the nature of such works, and the probable amount of coals which they would be able to convert into gas throughout the year, and the probable price the gas would fetch. Persons who were conversant with such matters would be able to give a reasonable opinion as to the sum which it would be worth their while to give for such property. Well now, if the true rental was what they were worth to let, and if he (Mr. Pashley) called before the court competent witnesses who had been permitted to inspect these works, who had formed an estimate of their capacity, who were fully aware of the price at which coal could be bought in Cambridge, and who knew also what the price of gas there was, the opinion of such persons, if competent and honest men, was the best evidence the court could have as to what the works were worth. In fact, they could form as correct a judgment as a farmer who had been farming in Suffolk could form of the worth of a Cambridgeshire farm, and what it would fetch to let. Such evidence he very much doubted whether the company would be able to set aside; because if they were to show that by negligence or carelessness they did not realize that amount, that because they did not manufacture with ordinary skill, because they had two fires when one would do, that they incurred a loss which they need not undergo, he was sure that evidence of that sort would not be considered material in a consideration of the rateable value of the property, any more than for a farmer to show, when appealing against his rate, that he farmed so badly that, though his land in other people's hands would be worth 30s. per acre, he was actually losing money by it. The payment of rent, however, was not always the exact measure of the rateable value, because it might be much underlet, as in the case of an estate of the Duke of Portland, where the tenants continued to pay the same low rents at which the land was originally let, although it had greatly increased in value since then. The question was—What will the premises let for? He would bring gentlemen before the court in order to show that what the valuers had done was fully supported, and, in fact, probably fell short of the actual worth; and those witnesses would be persons who were the most competent to give a practical opinion upon the point—viz., men who made it the business of their lives to take such property, and who, looking at these premises, said they would give so much for them. They knew that they were capable of making so much gas, that it could be made for such and such a price, that it was sold for so much, and that there was a profit of so much, which would have to be apportioned between the landlord, the tenant, and the repairs—the result being to give the true rateable value. He trusted, therefore, that upon this head of evidence alone the court would be quite satisfied that the case was made out. But he would not rest it on that alone. He would call before it the two gentlemen—Messrs. Lee and Penfold—who made the assessment. Something had been said about a former appeal here, but the court could know nothing about that decision on the present occasion; the result, however, was, that two years afterwards the guardians thought fit, in the exercise of the discretion with which the law entrusted them, to put the ratepayers to the expense of a fresh valuation. He might say with propriety that there was a dispute by the gas company, the present appellants, against the former assessment, and the guardians had now called in two gentlemen, both highly conversant with such matters, one having valued many parishes for the Poor-Law Commissioners, and the other having had great experience on railways. There was, therefore, every reason to suppose that the conclusion to which they had come was the correct one. From an inspection of the premises they were able to form a reasonable estimate of the capacity of the works and the probable earnings of the company, their receipts and outgoings, and the net value of the occupation. At the same time, as cautious men, finding that they could

not put the value at so low a figure as it had been done before, they *ex abundanti cautili*, to avoid any ground of cavil or dispute on the part of the company, made an allowance from the figures which in their judgment they ought to have acted upon. Notwithstanding that, however, the net rateable value came out at the sum found in the valuation now appealed against—viz., £2542. On this data, furnished in this way, the respondents had come to the conclusion that the valuation was probably too low, and the unanimous opinion of those competent gentlemen, who had taken leases of such property, and who had been consulted in reference to this matter, was that a higher rate ought to be fixed. The reason of the estimate formed by the valuers being so low was, that the information which they based their calculations upon was not given in a frank and open manner, but was obtained by driblets, and they had made these large deductions in order to be assured that they were not overrating the premises. There was another mode by which the rateable value might be ascertained. Although the respondents could not know all that was passing in the minds of the company, and could not get at the information which they refused to give, so fully as they could wish, yet one of the provisions of their Act of Parliament had enabled the respondents to get at some precise figures. By the 33rd section of the company's Act it was provided that the company should keep accounts, and should make up their balances to the 24th of June in every year, showing the amount of money collected and received by them, for their own use, by virtue of that Act, and the charges and expenses of maintaining and using the said works.

Mr. O'Malley: That is a provision in order to ascertain whether they are making 10 per cent. or not.

Mr. Pashley did not know what the object was, whether for the purpose of founding a professorship in the University or any sinecure in the town; he did not care, nor was it material to inquire. He hoped the town commissioners had received many thousands; he knew they had received £2000 from the surplus profits of the company. Now this account of actual income and expenditure was exactly what the respondents wanted to get at, in order to ascertain what sum a man carrying on the trade could reasonably pay for rent. The clause in the Act of Parliament to which he referred provided for the annual return of these accounts, and it enacted that, in case there should be a surplus profit of a certain amount, it should be paid over to the commissioners for improving the town of Cambridge. That surplus, in fact, as he should prove in due time, had been more than £2000 a year, and had been paid over in that way.

Mr. O'Malley: I assure you, you are under a mistake; there has not been anything paid.

The Recorder: You can set that right afterwards.

Mr. Pashley said it mattered not whether it had been paid to the commissioners or not—the accounts were to be balanced as he had stated. Nor did it matter whether the original shareholders gave such a sum of money for the site; whether the concern as a landowner's property returned a great per centage upon the capital embarked or not, the question was, what was it worth to occupy. There was a certain provision for handing over the surplus profits if after three years there was a surplus; and whether they had paid that surplus over to the commissioners, or had paid it to their shareholders, was quite immaterial. All the respondents had to deal with was the amount received and the expenses incurred in earning that amount as an occupation; nor had they anything to do with the question of whether the capital embarked by the original shareholders was £10,000 or £1,000,000. From the last account of the company, balanced up to the 24th of June, 1858, it appeared that the gross receipts for the previous year were £11,878, and he would just mention the items of which that sum was composed. There was, first, "Gas rental, £10,196," which included the receipts for public and private lights. Against this item they wrote off "Loss by bad debts, £100," carrying out the result of net gas rental, £10,096. The next item was "Sale of coke (of course one of the most important articles of refuse in a gas-work), £1759." The loss on that was £50, leaving a net receipt of £1709. Then there was the sale of tar, ammonia, rent of cottages, and sundry small items of receipt, £73, making an aggregate of £11,878. On the other side was found—"Coals, £4110; tradesmen's bills, £1637; wages, £1227; salaries, £563; repairs, £249." Rates and taxes they put down at £233, which he (Mr. Pashley) considered was not so high a figure as they were entitled to put them down at, and he was disposed to be extremely liberal to them in this matter.

The Recorder: Perhaps you will exclude it altogether.

Mr. Pashley said the items of expenditure which he had mentioned came to £8049, and deducting that sum from the net receipts, there was a balance of profits of £3829; and therefore, on their own showing, unless they had committed an error in the accounts, which under the statute they had made, there was this sum left in the pocket of the occupier subject to the payment of a portion of it for rent. In these accounts, however, there were three other items which they called a part of their expediture, but which were not such as a tenant could set off against receipts, inasmuch as they formed no part of the expenditure necessary to carry on the business and to earn the money which was received. They were for new works constructed, which, of course, was not an element in the consideration of the rateable value, except that when constructed they became a part of the occupation, and increased the value of the tenancy. The cost of such new works fell upon the landlord, who thereby secured to himself a larger rental from the tenant of the premises. The first of these items was "New mains," rendered necessary in consequence of the thriving business which the company carried on for supplying light in the dark places of Cambridge, if there were such, and to meet the requirements of the new houses which were springing up in the locality. They were, in fact, an extension of the works. The amount expended was not large—£147—but in this matter they must proceed on principle, and he only now mentioned it lest something should be said on the other side. Then there was a new shed for ammonia, £353, and a new gasholder, £1580. The same remark applied to these as to the first item: the cost of them did not touch the question of the rateable value; they were landlord's constructions, and the only difference was, that they subjected the tenant who was willing to erect them to have so much more added to the value of his occupation. Together, those which ought not to be included in the outgoings amounted to £2080, and reduced the net profits down to the beggarly sum of £1700. Omitting these expenses from the calculation, the net receipts of the company were £3829. This was not exactly the sum which a man would pay his landlord, for, of course, he must have something for interest upon his capital, and profit upon his labour. What, then, should be the proportion received by each? The evidence of gentlemen who were accustomed to take leases of such works would show that a tenant would be willing to rent them if he could secure to himself £600 or £700 a year, and therefore the net rateable value might be assumed at £3000. Messrs. Lee and Penfold, who had valued the works on behalf of the guardians, had estimated the gross receipts of the company at £10,432, which was actually below what the accounts of the company, to which he had referred, exhibited. They had estimated the outgoings at £7146, leaving a total annual value of £3276. This sum they had brought down, by an allowance for rates and taxes, to £2756. They had further allowed for other things which in strictness ought not to be deducted, and, as the result, they came to the conclusion that the true net annual rateable value was £2542. After referring to the facts which were subsequently proved in evidence, the learned counsel concluded by expressing a hope that the result of the discussion of the subject would be to arrive at a decision in which both parties could acquiesce, and which would settle the question of the rateability of the property of the company for many years to come.

Mr. *J. D. Fetch*, the clerk of the guardians, produced the minute-book containing the resolution of the guardians, which directed a valuation of the company's premises, and referring the subject to a committee to carry out.

Cross-examined by Mr. O'Malley: The object of the valuation was not to evade the decision of the quarter session. I have no hesitation in saying it was done for the express purpose of allowing the gas company, if they wished, to appeal to the last quarter session. It was not to raise the question which was raised before, but to ascertain the real rateable value. We had ascertained that, since the previous valuation, there had been a new tank constructed at a cost of £1500, a shed for ammonia, and that there had been an increase in the mains and pipes throughout the union, as well in their extension as in their diameter.

Re-examined by Mr. Pashley: The object of appointing the committee was this:—There had been an appeal against the valuation previously made by Messrs. Harwood and Mann, which was heard at the quarter sessions in January, 1857, when the amount was considerably reduced, subject to the opinion of the Court of Queen's Bench being taken on a case to be specially prepared. That case was drawn by Mr. Hawkins, the junior counsel for the guardians on that occasion, and sent to Mr. Adcock, the solicitor of the company, in the month of March in that year, and was not returned by him until the month of February, 1858. When received it was found that it was so thoroughly distorted as to the facts, that the guardians saw they could never get a case complete in order to take the judgment of the court above, and they were therefore advised to obtain a fresh valuation.

Serjeant Tozer called for the accounts of the company to the 24th of June, 1858.

Mr. O'Malley said the guardians had the published accounts of the company.

Mr. Pashley asked whether the accuracy of those accounts was admitted.

Mr. O'Malley would admit that the accounts were correct, as prepared with a view to ascertain the amount of dividend under the gas company's Act, but it must not be taken that he admitted them at all as accounts for the basis of a rate.

Mr. Pashley called for the book containing an account of all the mains and pipes of the company, with their diameters, &c., in order to ascertain the quantum of occupation.

Mr. Adcock said he was perfectly ready to supply the information. It was 15 miles and about 210 yards.

Mr. *Charles Lee*, examined by Serjeant Tozer.

I am a surveyor, and reside at No. 20, Golden Square, London. I have been in practice as a surveyor for thirty years, and have had great experience in the valuation of gas-works and railways during that time. In August, 1858, I was employed with Mr. Penfold, another valuer, to make a survey and valuation of the works of the Cambridge Gas Company. We made that survey together. We called at the gas company's office, and saw Mr. Gifford, the clerk, of whom we asked information and for permission to see over the works. That permission was not positively refused, but Mr. Gifford said he had no power to give it. We then thought it right to go to the works, where we saw the chairman, and were at first refused admission. Ultimately we did get permission to inspect the works. We saw sufficient of those works to enable us to say that we have made a proper valuation. We had permission to go where we pleased, but at the same time we had no information given to us. We made a plan of the works for our own use, and we made a general inspection of the town for the purpose of ascertaining what the consumption was. We were furnished by Mr. Fetch with the particulars of the length of the mains and pipes, but we had no information from the gas company whatever. [Paper handed up.] I had no further data than what is supplied in that paper. I make the net annual value £2542. The gross annual value was £3276. From that I deducted £734 for insurance, repairs, and renewal. The rates and taxes had been previously deducted, before arriving at the £3276. I have not any knowledge of what such property would let for; I have not had to do with actual letting. I have valued such property for the purpose of rating, to a very considerable extent, for parishes, and sometimes for gas companies. Since making this valuation I have seen data which, had I been in possession of at the time, would have led me to increase the net annual value. I have heard the figures which have been admitted to-day as the receipts for gas rental and the expenditure. If I had seen them before I should have increased my valuation. I think I should give the tenant from that £700 or £800 a year, and the rest would be rateable value. That would leave a rateable value of £3059, and that is what I say is the proper rateable value, assuming the data supplied by the company's accounts are correct. In that account there are three items, one of which is—"Mains, £147," which is not a proper item in the annual disbursements. It should have been added to capital, because it is an increase of the matter subject to rate. Another item is—"New shed for ammonia, £375;" that is certainly not a subject for disbursement, but should be added to capital. The "New gasholder, £1580," should also have been added to capital, as it is for the purpose of enabling the company to carry on a more extensive business.

Serjeant Tozer: I will call your attention in this account to one item—"Repairs, £249." Is that a sufficient sum in your judgment?

Witness: I should think it was. I had put down more; I put down £372, but it was conjectural.

Serjeant Tozer: Does £372 cover all the expenditure you think necessary for repairs?

Witness: Ordinary repairs.

Serjeant Tozer: The item of rates and taxes—£233—is that as large as you would allow?

Witness: No; I will tell you what I did put down—£509.

Serjeant Tozer: Your attention has been called to two other items—"Wages" and "Salaries"—for "Wages, £1227," and for "Salaries, £563?"

Witness: I put down £1683 for wages and salaries together.

Serjeant Tozer: Does the sum you have allowed for repairs cover accidents and repairs of gasholders, and every species of repairs?

Witness: Yes, but not the restoration of retorts. That is another item, and for "Wear and tear of retorts" I have £594.

Serjeant Tozer: What was your allowance for repairs?

Witness: £372, as distinguished from the renewal fund.

Serjeant TOZER: That did not include renewal of retorts?

Witness: No, nor the renewal fund generally.

Serjeant TOZER: What is the amount of that?

Witness: £350 a year, and the renewal of retorts beyond that is £594. I have also deducted £12 for insurance.

The court was then adjourned to Friday, the 14th instant.

FRIDAY, JAN. 14.

At the sitting of the court this morning, Mr. PASHLEY called for the books of the company from which the accounts presented to the Improvement Commissioners were taken.

Mr. O'MALLEY produced the book, signed by Mr. Shaw, chairman of the company.

Mr. PASHLEY said, on the face of it, this could not be the book that was produced to the commissioners, and he called

Mr. *Henry Staples Foster*, who said he was one of the auditors appointed by the commissioners, and in November last audited the accounts of the company to the 24th of June previously. The book now produced was a very different one, and the items of account did not agree with the memorandums he took at the time.

In cross-examination, witness declined to swear positively that it was not the book, but said there were alterations in it; he would swear there were. The item for wages did not correspond with his memorandum.

Mr. *Adcock*, the company's solicitor, and Mr. *Balls*, the mayor, were examined by Mr. O'MALLEY, and in the most positive manner contradicted the statements of the last witness.

Mr. *Shaw*, the chairman, was about to be called, but—

Mr. PASHLEY expressed himself satisfied with the correctness of the account.

Mr. *Charles Lee* recalled, and examined by Serjeant TOZER.

Since the last court, I have reduced to writing the evidence which I gave on that occasion. I find, by reference to the accounts furnished by the company, that my statement of receipts is larger than theirs by £301, and my disbursements are less by £250; so that there is an error, as compared with the company's accounts, of £551. The amount which I had put down for contingencies is £665, as I had no information given me, and I thought things might not turn out exactly as I had them. The difference to be added to the rateable value is £114. The hypothetical estimate was, therefore, smaller than it would have been if the items had been furnished to me.

Cross-examined by Mr. O'MALLEY: I was first consulted about this valuation, in the beginning of August last, by Mr. Fetch and a member of the Board of Guardians. At that time Messrs. Harwood and Mann's estimate was not laid before me, nor the accounts of the company. I was furnished with the particulars of their gross rental and expenditure, the number of their street lamps and the price paid for same, the length of mains, and some further data of that description. It was by my advice Mr. Penfold was called in. Before I was engaged to make the valuation it was ascertained whether in my opinion the rateable value was above £1000. At that time I had not seen the company's works. I am acquainted with Mr. Penfold's treatise on the law of rating. As regards public-houses, I do not agree with him that "it is necessary to go into a calculation of the receipts and expenses, in order to determine the question" of the mode in which to ascertain the rent a tenant will give. In estimating the value of engineering works, I should not go into the question of profits. In assessing a farm, I should not ask the farmer to produce his balance-sheet. I do not know of any other properties in which it is necessary to enter into a calculation of the receipts and expenses absolutely going on, except those of a railway, and a gas or water company. Certainly not in the case of a coal-merchant's yard, nor the premises of a miller. Mostly we compare one with another, and some with parallel cases.

The RECORDER: Then why should you with a gas company?

Witness: Well, I think from the decisions it is necessary.

Mr. O'MALLEY: But suppose you were satisfied that all the decisions were the other way?

Witness: I should abide by the law.

Mr. O'MALLEY: But here (referring to Mr. Penfold's book) you have law by the highest authority.

Witness: No, I do not take that as law.

The RECORDER: But you do the decisions of the Court of Queen's Bench?

Witness: Yes, and the courts of session.

The RECORDER: How am I to take your answer—that you go by general usage and experience?

Witness: Yes—and the decisions. I was engaged in the Mile-End case.

Mr. O'MALLEY: Perhaps, then, guiding yourself by the decisions of the courts of law, you will point out to me a decision of the Court of Queen's Bench in which it was held that profits should be taken?

Witness: Not in the case of gas companies; in water companies there are. There is the Mile-End case.

Mr. O'MALLEY: That is the way you understand that case?

Witness: No doubt of it.

In further cross-examination, witness said: Mr. Penfold and I sometimes differ very widely. When I value for gas companies I have some data to go by, so that it generally happens that my estimates are lower than when engaged for the parishes. If there were two gas companies in one locality, the works of which were equally extensive and the mains of equal length, but one driving a business of three times the amount of the other, I should certainly rate them differently, provided that the same skill was exercised in carrying on both concerns. I should exercise my own judgment about the skill, and if I found one company producing 9000 feet per ton and the other only 7000, I should say in the latter case there was a want of skill, and should put a penalty upon that want of skill.

By the RECORDER: According to my valuation of the Cambridge Gas-Works, I should say a tenant would give £2542 to rent them.

By Mr. PASHLEY: Correcting my estimate by the data supplied in the company's accounts, I find that the net money in the tenant's pocket at the end of the year would be £3859. I should therefore give the tenant for his capital and trouble £859, which would leave £3000 as the rental to be paid. Out of that sum the landlord would, according to my judgment, have to put by for a depreciation-fund £350 only, because all the repairs would be done.

By the RECORDER: I should make no other deduction, and all the rest is what the tenant would pay for rent. That is an assumed state of things. Taking the evidence before me, my answer would be that the rateable value was £2542. I am, then, £114 below what the company's accounts prove to be the fact, so that the net rateable value may be taken at £2650.

By Mr. PASHLEY: In rating canals you must take the same principle as you do in gas and water-works, but in most cases with which I have had to do there has been an Act of Parliament. One reason for adopting the same principle and ascertaining the profits is the fact of the works being very large, and spreading through various parishes. Besides, I think it is a reasonable thing, and I can conceive of no other mode of ascertaining what a tenant would give. During the last ten years I have not known any instance of its being necessary to get at the rent by means of getting at the profits. The contention has always been as to the quantum of allowance to the tenant.

By Mr. O'MALLEY: In arriving at the rateable value of £2542, I have taken no other basis but the gross receipts, and I should always vary that value according to the actual receipts, with this exception, that the less skill was manifested, the more I should put on. A tenant would do the same if he saw bad management. In gas-works, whether conducted by a company or an individual, I should put an arbitrary limit on the profit. I should make none with a brewer or distiller. In point of fact, I do not take the value of the buildings, but the value of the trade, except in questions of division; then I should take the buildings. You must suppose that the buildings are proper and sufficient for the purpose.

Mr. *Alfred Penny*, examined by Mr. PASHLEY.

I am the occupier of extensive iron-works in the Wenlock Road, London. I have been engaged for many years as an engineer, and also as contractor in the construction of gas-works, and have considerable experience of the structural value of such works, and of the mode of conducting them. For three years I was lessee of the Portsmouth Gas-Works, supplying a population of 80,000 persons. I have inspected the works at Cambridge, and should say that the annual consumption of coals in the manufacture of gas there is about 5000 tons. I have taken the price at 16s. per ton, which would be reduced to 8s. by the sale of coke, tar, and ammoniacal liquor. The net cost would therefore be at the rate of 9½d. per 1000 feet of gas. The lime required for purification would cost ½d. per 1000, and the cost for wages, including everything but lamplighters, I have taken at 4d. per 1000. For lamplighters and the cost of cleaning and repairing lamps I allow £260; wear and tear of retorts, £520; inspectors, collectors, and manager, £468; bad debts, £165; and interest on capital, sundries, &c., £468, the capital required being about £2000. Deducting the whole expenses, including tenant's repairs, there would be a balance of £4375. If the landlord were to lay by and invest £400 a year, it would be sufficient to provide for the renewal of things worn out. Not knowing what the taxes are, I have assumed £800 to be the sum which, with the £400 for depreciation, would have to be deducted, leaving a net rent to the landlord of £3175; and I should be prepared to pay that rent for them, satisfied that there would be a sufficient sum left to recompense me for my trouble and outlay of capital.

Cross-examined by Mr. O'MALLEY: I do not know anything about goodwill; if I took the premises, it would be for the purpose of making gas on them. If there were another set of works in the town I should certainly not take them at that. I have estimated roughly that a ton of coal would produce 10,000 feet of gas, and I take off 20 per cent. for leakage, leaving 40,000,000 feet for sale.

By Mr. PASHLEY: In addition to the rental I would give 10 per cent. upon whatever outlay the company made in extensions.

Mr. *George Anderson*, examined by Serjeant TOZER.

I am a gas engineer, and am at present the contractor for the Dover and Waterford Gas-Works. I have examined the works here, and made a calculation of the rental which could be given for them. The conclusion I arrive at is, that they would be worth £3736 to a tenant renting the same. I deduct all the expenses before I arrive at that sum, which is the net sum the landlord would receive. It is my estimate of what I would give for the works, I paying rates and taxes, which I have assumed to be £500 a year. I should have no objection to become lessee of the works, to pay that rent, and also provide for the wear and tear which is constantly occurring, and the maintenance which occurs at certain periods. If the company were to renew, I would increase the rent by the sum which I have put down for renewal. The tenant's capital required I put down at £2000, and I calculate that I should get £1000 a year out of the concern.

Mr. *Henry J. Castle*, examined by Mr. PASHLEY.

I am a valuer, and have had experience in the valuing of public works, such as railways, &c., for the purpose of assessment to the poor-rate. During the last ten years I have never known any question as to the principle upon which gas-works should be rated—viz., that of ascertaining what are the profits, and thus getting at the net rent. Taking the consumption of coal at the Cambridge Gas-Works to be 5000 tons, the gas rental would be £10,433; the tenant's outgoing, £6086; and the net receipts, £4347. In order to get at the true rateable value, the deductions from this sum would be—tenant's profits, £800; rates and taxes, £550; landlord's renewal fund, £250; and insurance, £12, leaving a balance of £2735.

Cross-examined by Mr. KEENE: That is the sum I should give to step into the company's shoes, as far as the carrying on of the business is concerned.

Mr. *Frederick Randell*, clerk to the Improvement Commissioners, produced the contract with the company for the public lights. The sum paid for the last four years appeared to be £8932. 16s., and the amount due to end of 1858 £972.

Mr. *Charles Penfold*, examined by Mr. PASHLEY.

I have had great experience as a valuer in respect to the assessment of property rateable to the relief of the poor, especially of extensive property lying in different parishes, such as canals, gas and water-works, and railways. In conjunction with Mr. Lee, I have examined the works at Cambridge. [Witness corroborated the statements made by Mr. Lee as to the returns, and gross and net rateable value of the premises.]

Cross-examined by Mr KEENE: When I was first spoken to on the subject, the question was put to me by Mr. Fetch, whether the guardians were justified in submitting to have the works assessed at £1000. I knew there had been a previous valuation by Messrs. Harwood and Mann, and I was also aware there had been a decision by the recorder amending it. We talked it over on that occasion. In my book on rating there is a formulæ for assessing gas or water-works, and for ascertaining the receipts in the different parishes or districts. I did not go through all that on the present occasion. Railways, gas and water, and other public works, farms, public-houses, &c., and, in fact, anything where the lease will convey the profits ought to be assessed on the same principle. I do not see that I differ from Mr. Lee as to breweries, distilleries, &c.; the profits do not necessarily follow. Generally speaking, I coincide with him. I should not rate a brewery, distillery, or foundry as I should these works. I consider that gas-works should be rated in the same way as railways, canals, &c. From my experience, I should say that the hereditaments of the Cambridge Gas Company might be expected to let for £2542, and that is the sum which I should give to step into the company's shoes. I am acquainted with the statute 3 & 4 Vic., c. 89, which exempts stock in trade from being rated. I have had great experience. I am defender of the parishes; I don't know what would become of them without me. I do not think, however, that my pursuits have led me to magnify the amount at which these companies are to be assessed. I always work it out upon the same principle, whether it comes

to more or less. I had an office in Cornhill entitled "Parochial Assessment Office." I do not consider that the greater or less degree of success with which a manufactory like a gas-work is carried on, is to be considered an ingredient in calculating the real rateable value. I should assume, in the case of two companies in the same town, and with the same capabilities, that the same skill was exercised in both, and I should form my own judgment without reference to whether they succeeded or not. I should inquire myself what the occupation would produce in each case. It would be *primâ facie* evidence that one was better than the other if one yielded an annual profit and the other did not, and I should certainly take that into consideration.

By Mr. PASHLEY: That would be the natural conclusion to arrive at in the absence of anything to qualify it; but the mere fact of one company making a profit in any one year would not be a fair ground for drawing a distinction.

By the RECORDER: The data supplied to me by Mr. Fetch was the price of coal, rental of gas, &c., and some particulars of that kind to enable me to come to a conclusion.

This was the case for the respondents.

Mr. O'MALLEY, for the appellants, submitted that the valuation was a bad one, and could not be sustained. The 36th clause of the Cambridge Award Act empowered the guardians to make a survey and valuation of the whole or any part of the assessable property in the union; and if the course now taken by the guardians were sanctioned, and they were allowed to give former decisions of quarter sessions the go-by, they would convert that section of the Act into an organ of monstrous oppression. But in order, if possible, to obtain a final decision of this question, he (Mr. O'Malley) would not insist, as he thought he had a right to do, that the guardians were bound by the previous appeal. The court had the power, if it deemed it proper, to quash this valuation altogether; but that was not a course which he desired in finality the recorder would do. Every amendment of the rate was an amendment in mercy to the guardians, and not to the persons who were appealing against the rate; he therefore trusted that when the court had heard the whole of this case, and had decided, as he believed it would decide, against this monstrous rate of £2400, the expenses of the contest would not be thrown upon the company, who came there backed by the authority of a decision of the session already given in their favour. According to that decision the whole rateable value of the company's property had been fixed at £492; that value they were told had since been increased by the erection of an ammonia shed, and therefore a fresh valuation was necessary; but substantially and in fact this was an appeal by the guardians against the former decision of the quarter sessions. Upon that decision a case was prepared for the Court of Queen's Bench, which, however, was abandoned by the board on the very day they resolved to make a fresh valuation. The company had subsequently proposed an amicable adjustment of the matter, and for the sake of peace had acceded to an arrangement, whereby the value of their property would have been fixed at £1100. This was an arrangement which the parishes, as distinguished from the guardians, considered advisable; but, actuated by ill feelings, and availing themselves of a quibble, the guardians abandoned that arrangement. Now, the first question which he (Mr. O'Malley) had to call attention to was the Acts of Parliament on which this case turned. He took these from the ingenious, if not very learned, treatise of Mr. Penfold, and he might say in passing that a more ingenious trap for dragging the rating of the whole country into the offices of this gentleman, and the setting up of a new profession and trade, he had never seen in the whole course of his life; and it would be found by-and-bye that if Mr. Penfold's view of the question were adopted, it would be necessary every year, in every parish in England, to refer the question of rating from the vestry to gentlemen of the profession to which Mr. Penfold belonged. This gentleman had collected together in his book the Acts of Parliament on rating, apparently for the purpose of showing with what great ease a person of his ingenuity could set them all aside. The first Act referred to was the Parochial Assessment Act, and that part of Mr. Penfold's book he trusted the learned recorder would be able to comprehend; he would not flatter him so far as to say that he believed he would comprehend the rest. He had not at present met with anyone that could, and evidently Mr. Penfold himself did not. Now Mr. Penfold and Mr. Lee, as well as the other valuers that had been called, struck out from the Act the word "hereditaments," and put in "the value of the several trades." Mr. Lee, with perfect fairness and candour, admitted that he discarded all questions of the value of the buildings, and took as his basis the profits of the trade. The inherent vice of all the calculations made by these gentlemen was that they ignored the principle upon which the Act told them to base their valuations, and took what it distinctly forbade them to take—the profits of trade. In the Parochial Assessment Act not a word was said which could be construed into giving the valuers appointed by the guardians the power to investigate the accounts in order to arrive at a just conclusion on the subject. There could be no surer test of what the Act of Parliament meant, and the sort of valuation it contemplated, than that fact. But the guardians had not only acted at variance with the provisions of that statute, but also of the Act 3 and 4 Vic., c. 89, which distinctly forbade their taking the profits in trade as a basis for their valuation. The learned counsel quoted at some length from the reported cases to show that the courts had never sanctioned the adoption of the principle contended for by Messrs. Lee and Penfold. If, then, the principle from which these gentlemen started was utterly erroneous, the superstructure which they had reared must be erroneous also; and therefore, if no other evidence were supplied, the learned recorder would be justified in disallowing their valuation. When the case for the appellants was heard, he trusted it would be clearly seen that they supplied the right principle on which to found a judgment, and that the recorder would not quash, but amend, the valuation, so as to fix the amount at which the company should be rated, and thus put an end to any further litigation on the subject.

Thomas Hawksley, Esq., examined by Mr. KEENE.

I am a civil engineer, residing in Great George Street, Westminster, and have been very largely engaged in the construction of gas and water-works, and in ascertaining their value. I have been so engaged for the last twenty-eight years on my own account. I was engaged on the former occasion, and have been recently engaged in valuing the works of the Cambridge Gas Company. Mr. Simpson was with me on the latter valuation. The sum at which those works should be assessed—that is, the value of the hereditaments—is £602. 0s. 8d. I mean that that is the value of the land, buildings, and all other structures which would pass to the heir; the structures which are fixed to the freehold. It also includes the value of the land occupied by the pipes, but not the pipes and mains themselves. It is that sum which a landlord building these premises would expect to receive from a tenant in the shape of rent, free of all rates and taxes, and other deductions under the Parochial Assessment Act. The gross sum at which I have valued them is £661. 1s. 8d. The deductions consist of a sum of £50. 13s., which is 1 per cent. upon the structural value, to enable these buildings to be maintained in a state to command that rent, presuming them to endure for a period of seventy years. I then deduct £8. 8s. for insurance. Those are the only deductions I make. [Witness gave the several items of which the gross rateable value, according to his estimate, were composed.] The total structural cost I estimate at £5742, and I have taken 7½ per cent. upon that as the landlord's rent, which is the usual per centage in such cases, and would be a proper return for capital so employed. Exclusive of the hereditaments and the mains in the streets, the machinery and apparatus are of the value of £7984, and the land occupied by the pipes would let for £240, or at the rate of about £80 per acre. The pipes are not included in this estimate; it is only the occupation of land by a chattel, and the value of the chattel is not at all included

Cross-examined by Mr. PASHLEY: I have not included that part of the ovens above ground which are used as a still, but I have taken into account the foundations. [Witness gave particulars of his estimate of the value of the retorts, condensers, gasholders, mains, &c.] In my judgment the rateable value of this property would be identically the same if the amount of rental obtained by the company were only half what it now is. So soon as property of this kind will command a rental, the value at which it will let is a certain per centage upon the cost of construction, differing according to circumstances. Manufacturing premises generally command a rent of from 7 to 9 per cent. In my opinion the amount of demand which a tenant would find for the article manufactured is to be disregarded, and that in ascertaining the rateable value the inquiry should be limited to the cost of construction.

By Mr. KEENE: In my experience I have never known an instance in which gasholders have been assessed. They stand upon the same footing as the tubs and vats in a brewery or distillery.

Mr. PASHLEY said he regretted that no indication had been made on the other side that anything would be said about structural value. It was usual to do so, and he should have been prepared to meet it.

An adjournment here took place. When the recorder again took his seat,

Mr. O'MALLEY intimated that he was prepared with the evidence of several important witnesses, the substance of which would be identical with that of Mr. Hawksley's. He had intended to call Mr. Simpson, the eminent engineer; Mr. Laing, the engineer and manager of the Independent Gas Company's works; Mr. Grafton, who was the consulting engineer of the Cambridge Gas Company; Mr. Christie, who was a gas engineer of experience in London; Mr. Tadman, the chief engineer of the gas-works at Norwich; and Mr. Peck and Mr. Gray, builders in Cambridge; but during the interval of adjournment, his learned friend, Mr. Pashley, had agreed, for the purpose of shortening the inquiry, to admit that, if the principle of taking the structural value were the correct one, the property of the company would be rightly assessed at the sum named—£700 or £750.

Mr. KEENE then proceeded to sum up for the appellants. He said there appeared to be between the appellants and respondents a contest of principle upon the application of what he should have thought were two very clear Acts of Parliament. On the side of the former it had been enunciated by Mr. O'Malley and established by Mr. Hawksley, that the assessable value of the property was the annual rent which a tenant would give for the premises; and on the side of the latter the court had had presented, not the rent, but the sum which a speculative person might be disposed to give to be placed in the precise position in which the company stood. If the views propounded by the witnesses for the respondents were adopted, it was the landlord who was entitled to receive the largest amount of profit which the property was capable of yielding, and not the tenant, whose capital and energy were expended in making it productive. The Act of Parliament distinctly declared that it should not be lawful to tax any inhabitant of a parish in respect of his ability, derived from the profits of stock-in-trade, or any other property. The value of the company's position, taken as the respondents had put it, was a fluctuating value, for the Improvement Commissioners might permit other gas-works to be erected in the borough to which the appellants' trade might be transferred. The duty of the guardians in valuing the property was to get at rent, not at profits; and the mode in which the appellants proposed to ascertain that matter bore the strongest family likeness to the mode prescribed by the Legislature. The company were not to be taxed for the skill or success with which their business was conducted, but only for the value of their land and buildings to a tenant from year to year. They were to be rated on their hereditaments, not on their stock-in-trade; and their engines, gasholders, tanks, &c., were no more liable to be assessed than the vats of the distillers or the drays of the brewer. After referring to some of the cases which had been cited, as well as to others, the learned counsel concluded by saying that, in so far as the appellants were concerned, the decision of the recorder would be a final one; but in reference to the guardians, if they were dissatisfied, they had power under the Award Act to cause a fresh valuation to be made again and again, until they found in the accidents of time a judge to their own mind, or until the company, overwhelmed by the costs of such proceedings as the present, abandoned all further defence.

Mr. PASHLEY replied upon the whole case at great length, reiterating his former arguments, and contending that all the cases which had been cited tended rather to strengthen the views of the witnesses for the respondents than those enunciated by the learned counsel for the appellants.

The RECORDER, in delivering judgment, said: I am of opinion, and I decide, that this valuation must be amended, and I put the rateable value of this property at £1700. I take this opportunity of saying that I regret extremely the amount of litigation of which this company and the board of guardians have been the cause; and I do trust that this decision will be the means of putting an end to all further strife on the subject. I find great difficulty in coming to a decision, but I think that £1700 is the fairest amount at which I can arrive. I have to judge between £750, which is the highest amount given to me on the one side, and £3750, which is the greatest amount given to me on the other. I have to draw a conclusion upon that. It is totally impossible for a person who is not conversant with such matters, and has no knowledge of such property, to come to any really accurate conclusion as to its rateable value; but I think that the parties in this case will be satisfied with this decision, which is about one half of the difference between them. I cannot forget that the company last year offered to be rated at £1000; and I think, therefore, they will be satisfied if I say that £1700 is the proper valuation.

Mr. KEENE inquired whether that was to be considered the gross rateable value?

The RECORDER said it was the net amount. He took the gross at £1850.

Mr. O'MALLEY most respectfully asked, after such a decision, which he presumed had been arrived at without adopting either the one principle or the other, that the recorder would grant him a case for the Queen's Bench.

The RECORDER said he had adopted the principle of the respondents, and

would grant a case on the question whether that was a correct principle or not.

Mr. O'Malley applied for costs.

The Recorder said each party must pay their own.

After some conversation it was agreed that the case for the Queen's Bench should embrace not only the question of the principle of ascertaining the net rateable value, but also of the rateability of mains and the jurisdiction of the court on the preliminary objection raised by Mr. Pashley. It was also arranged that the remaining appeals should be respited from session to session until the decision of the Queen's Bench is given on the case now reserved.

Miscellaneous News.

THE MANCHESTER GAS-METERS.

A meeting of the Manchester City Council was held on Wednesday, the 5th inst.—Ivie Mackie, Esq., Mayor, presiding. The business related chiefly to Mr. Crosley's gas-meter.

The Town-Clerk read the proceedings of the various committees. The gas committee had withdrawn an order from Messrs. Parkinson, for meters, in consequence of their declining to adopt the suggestions of the committee in relation to cutting down the spouts to the true water-level. A letter was read from Mr. Crosley to the gas committee, stating that he was in attendance to submit the meter recently reported upon by Mr. Taunton to a further test. Mr. Crosley thought it proper to inform the committee that this meter was constructed to provide against certain frauds, and required more pressure to work it than the meters in general use. Mr. Crosley requested that none of the seals on the meter might be disturbed, and expressed his willingness to submit the meter to any test in his presence. Mr. Crosley added, that he had remained in Manchester a week after the last council meeting, but, not being asked to produce the meter, he left. In conclusion, when Mr. Taunton applied for a meter, he requested it might be one embracing all the precautions against fraud and wrong registration. It was resolved by the committee to desire Mr. Crosley to submit the 5-light meter reported upon by Mr. Taunton, and to return the 3-light meter of Parkinson's, lent to him for experiment. Also, that Mr. Crosley's meter, and any others in use, be submitted for examination and report to Mr. Thomas Hawksley and Mr. George Lowe. In place of this motion, the following amendment was moved:—

That Mr. Hawksley and Mr. Barlow, in conjunction with a third gentleman to be selected by them, be requested to undertake a series of experiments upon such 3-light meters in actual and general use in Manchester as they may see fit, and upon such other new 3-light meters, including one of Crosley and Goldsmith's patent (the indices of which shall register up to 1000 cubic feet at least, and which may be read off to the 1/100th part of a foot), as the gas committee may procure from Crosley and Co. and several other makers to be submitted to them, with instructions to report thereon with regard to the following points:—

1. What is the variation per cent. from the legal standard of measure in the registration of each meter when charged with water to the adjusted water-level, while passing atmospheric air of the same temperature as the water in the meter, at the rate of 100 revolutions of the measuring-drum per hour?

2. What is the variation per cent. from the legal standard of measure in the registration of each meter when filled with water of the temperature of 60° Fahr., or thereabouts, up to the highest point the meter will bear without intercepting the passage of the gas for the supply of a burner consuming at the rate of 3 cubic feet of gas per hour or thereabouts?

3. What is the variation per cent. from the legal standard of measure in the registration of each meter when filled with water of the temperature of 60° Fahr., or thereabouts, up to the highest point the meter will bear without intercepting the passage of the gas for the supply of as many burners consuming at the rate of 8 cubic feet of gas per hour or thereabouts per burner, as indicated by the badge on the meter?

4. What is the variation per cent. from the legal standard of measure in the registration of each meter when charged with water of the temperature of 60° Fahr., or thereabouts, to the lowest point the meter will bear without intercepting the passage of the gas for the supply of a burner consuming at the rate of 3 cubic feet of gas per hour, or thereabouts?

5. What is the variation per cent. from the legal standard of measure in the registration of each meter when charged with water of the temperature of 60° Fahr., or thereabouts, to the lowest point the meter will bear without intercepting the passage of the gas for the supply of as many burners consuming at the rate of 8 cubic feet of gas per hour or thereabouts per burner as indicated by the badge on the meter?

6. In what space of time will the water with which each meter shall have been charged to the adjusted water-level be so reduced by evaporation when fixed in a room the temperature of which shall be maintained at Fahr., or thereabouts, as to cause the partial closing of the valve and diminish the flow of gas below 8 cubic feet of gas per hour per burner as indicated by the badge on the meter, with a pressure on the inlet of the meter equal to a column of water 6-10ths of an inch high?

The amendment was lost by 7 against 3.

The Town-Clerk said he should be glad if gentlemen would say when he was wearying them, but he did not like to omit reading these proceedings. (Hear, hear.) The town-clerk added: But I don't understand them; perhaps you do.

Alderman Willert: Nor do I. (Laughter.)

The Town-Clerk continued to read the minutes: Another letter was read to the committee from Mr. Crosley, to the effect that he was quite willing to abide by the motion which Mr. Rumney informed him he made at the meter sub-committee on the previous Wednesday. Mr. Crosley added that he regarded the thorough investigation of the subject, as proposed by Alderman Bancroft at the last council meeting, to be necessary, for then the gas consumers would have such information before them as they had been led to expect.—A letter was read from Mr. Cleminshaw, offering to resign on the 25th of March, on account of failing health. The subject was referred to a sub-committee.

Councillor Curtis, on the minutes of the gas committee being moved for adoption, called attention to the decreased income, and the undesirableness of making further extensions in the face of such decreased income. He saw by the report that the gas receipts had not varied more than about £5000, yet the same report recorded an increased expenditure of £34,000. And now it was said that they were going to expend £39,000 more. If they only increased the production of gas to the extent of £5000 a year, and spent £30,000 to £40,000 additional every year, he left it to the council to decide whether or not that would be a profitable concern. He thought the committee ought to give some explanations why these large extensions of the works were made while they were not increasing their receipts.

Councillor Rumney wished to make a remark, if in order, without opening up the question of meters—(hear)—because the battle had been fought and won. (Hear, hear.) The high-spouted meters were no longer used by the gas committee—(hear, hear)—therefore, the battle of the spouts was over. (Laughter.) Mr. Rumney said he wished to refer, if in order, to a report which he had respecting his own meter from Liverpool, and to another report he had received from London.

The Town-Clerk: That is opening the whole question.

Councillor Rumney: I should give the report without comment.

The Town-Clerk: Of course, it is opening the whole question. It can hardly be said to arise upon the gas proceedings.

Councillor Rumney: It is a point of order. I sent my meter to Liverpool, and I have the report upon it.

The Town-Clerk: Which is satisfactory to you.

Councillor Rumney: But I want to present it to the council.

The Town-Clerk: You can say it is satisfactory to you.

Councillor Rumney: It is not in order then? (Cries of "Go on.") Not if I am out of order.

The Town-Clerk: It does not arise fairly upon the proceedings read. The only resolution is that the proceedings be approved.

Councillor Rumney: I would merely say in reference to one point in the report, that I am very much surprised the town-clerk did not understand the amendment which was moved, and it can only be accounted for by the fact that he has not given much attention to the subject—(laughter)—because nothing can be clearer to anyone who has, than the rather perhaps lengthy statement which he has read, which was proposed as an amendment, but not carried. It was merely to obtain an investigation and an opinion, and the notice referred to the points needed for a complete investigation. If you are going to examine one of the high-spouted meters, it is obvious that the examination must be upon the lowest water-line and the highest, and with the smallest quantity of gas and the largest, it is calculated to register. Now it only embraces those very simple points. Perhaps they might have been put in fewer words, but there is nothing complex in them, and the investigation must embrace those points, otherwise it will be perfectly worthless. (Hear, hear.)

Alderman Clark: I think, sir, there was something that Mr. Rumney might have said upon the proceedings of the gas committee which have been read, without being out of order. If my memory does not deceive me—and I have a very strong impression—Mr. Rumney at our last meeting stated that the meter submitted to Mr. Taunton was, as he had satisfied himself from the stock-book in London, taken out of the stock. Now, in those proceedings there is a letter from Mr. Crosley stating that it was a meter made in a peculiar way, confirming the statement made by Mr. Taunton. (Councillor Rumney: No.) Why, Mr. Mayor, if the statement made about the stock-book could convey any meaning to those who want to understand what is honest and fair, it could only have the meaning that it was an ordinary meter. (Hear.) Mr. Crosley himself now says that it was a meter prepared for a particular purpose. (Hear.) And, sir, there is another thing I should have liked to have heard something said about, for I do not want to go into this question at length—and I make my observation as much in relation to other committees as I do to the gas committee—that I feel pained and disappointed at hearing a letter read from Mr. Crosley stating that he had been informed by a member of the sub-committee as to the motion that he proposed to make. (Hear, hear.) It appears to me, sir, that, if this practice is to be introduced into the committees of this council, in place of representing the constituents of the wards that elect us, we shall be representing the interests of individuals. (Hear, hear.) I heard that read with surprise and with very great pain.

Councillor Rumney claimed a word in explanation, and said, I think the statement made was with reference, not to the resolution which I was to propose, but the resolution which I had proposed.

The Town-Clerk: That is all right.

Councillor Rumney: That makes a material difference, and I think it is to be regretted that Mr. Clark did not make sure of being quite accurate himself before he takes upon himself to correct other people. (Hear.) In reference to the other matter, what I stated was perfectly true, and it has not yet been contradicted in reference to Mr. Taunton, and Mr. Taunton is put into the position of having to substantiate his charge.

Alderman Clark: That is arguing the question, and I must reply. (Order.)

Councillor Rumney: I have not stated anything that I am not able to prove to be correct.

Alderman Bancroft: I was rising to make one observation, which has been made by Alderman Clark, feeling, as I did, that the knowledge and the powers, if you will, of members of this corporation should not be used for private purposes in any way whatever, or with a view of furthering private purposes. I do not say they were, but certainly the course seems to me a most mistaken one that was adopted. What I proposed and intended was simply this, not that instruction which might be adapted to bring out the qualities of any single meter should be given to the parties who had to examine the meters, but that all meters having any pretension to superiority whatever should be submitted to some competent parties, and that they should judge of all the incidents to which these meters are liable, and make a report to the council as to the merits of each and all of them for the guidance of the council—(hear)—not that there should be a specification which would bring out the qualities of one meter and not the qualities of another; and therefore I should have objected distinctly to any such resolution as that put on the book.

Councillor Haworth: I beg to observe that Mr. Rumney desires nothing but a fair examination.

Councillor M'Dougall: The arrangements made by the gas committee entirely meet the statement made by Alderman Bancroft; they have appointed two very competent engineers, and they have refused to fetter them with any conditions. (Hear, hear.) Many gentlemen may have seen a letter stating that the gas committee shrink from a fair investigation of this subject. Nothing can be farther from the truth. The restrictions that were proposed to be put upon those gentlemen have been refused entirely, and they are instructed to make the fullest and fairest investigation of the whole subject which their ability, knowledge, and experience will enable them. It was proposed that a gentleman should be present at all these experiments. The committee said that any gentleman owning a meter might have any one present he pleased, but they will not impose the presence of either one person or another; they shall have the problem to solve, and have their own way of doing it. Mr. M'Dougall explained that the reduced consumption of gas, consequent on bad trade, the increased price of cannel, and the decreased demand for coke had been the chief causes for the diminished receipts. The deficit upon the lessened consumption of gas was about £1700. The increased charge for cannel was about £5000, and the full effect of the high price of cannel had not been felt; a considerable quantity of the cannel used during the year was the low-priced. He was sorry to say they were now thrown entirely upon the high-priced cannel, and this cause would affect the profits for the future. The same cause that affected the demand for gas lessened the demand for coke, and they were under the necessity of selling it at a greatly reduced price to get rid of it. Lastly, there had been increased taxation, making up the total amount of the diminution in the gas profits.

Alderman Heywood thought it necessary to say a word or two with re-

ference to what he considered the contest, which at present was not completely finished between Mr. Crosley on the one hand, and the gas committee on the other. Having been a member of the council for a considerable time, he was not disposed to withdraw the confidence which he felt towards the members of the gas committee. (Hear.) He looked upon Mr. Crosley as he would look upon any other man who was a competitor—that he was anxious to dispose of his article to the best advantage, and as largely as possible. He always looked with suspicion, and he thought the council ought, upon a man who came forward with such professed objects, because he came, not as a member of the council came before the public, but with an interested view, to press forward his own personal interests. At the same time he felt persuaded the committee and the council would be willing to hear Mr. Crosley, although he had personal interests to advance.

Councillor RUMNEY: Mr. Mayor, I call Alderman Heywood to order. I was not allowed to open the whole question, and I did not do so. If I bow to the decision of the chair, I must call upon the chairman to bind others to the same rule. (Hear.)

Alderman HEYWOOD: I will drop that. I merely wish to say that, as far as the proceedings of this committee are read this morning, I have the fullest confidence that the gas committee will carry out the investigation in connexion with the meters as honestly as either Mr. Crosley or any other man in the country would do. (Hear, hear.) I have the assurance also from Mr. M'Dougall that the course suggested by Alderman Bancroft is the one they are carrying out. Now, what more can the council require, or what more can the public require, than that? If we are dissatisfied with the committee, if we have not sufficient confidence in them, if we believe that they cannot perform, or will not perform, the duties which this council imposes upon them, then we ought at once to withdraw our confidence from them—(hear)—but so long as they are disposed, and have carried on perhaps one of the largest businesses in connexion with the council so satisfactorily for a number of years, I should be wanting in my duty to the council and the committee if I did not, on the occasion when their proceedings are read, vindicate them as far as I possibly could by voting for the confirmation of their proceedings.

Councillor KING said he was very glad to hear of the intended examination into these meters, which he hoped would be thorough. He thought that when the investigation took place, the proprietor of the meter ought to be present to give his explanations.

The TOWN-CLERK said he was going to correct Mr. M'Dougall in that respect, because the committee had distinctly authorized and agreed that Mr. Crosley was quite at liberty to make it a condition that he should be present when his meter was examined; but to any other condition they would not submit. No doubt the same would apply to other makers of meters to be tested; they might be present if they wished, but Mr. Crosley was the only one who had made that a condition.

Alderman NEILD hoped they might now be permitted to proceed with the other business; if there was so much discussion upon the proceedings of every committee, their business would be interminable.

The proceedings of the gas committee were then approved, and the council proceeded with the other business before them.

MR. FLINTOFF'S NEW IRISH BUBBLE.

A Meeting of the projectors of the "Independent Gas Consumers' Company" was held at their Offices in Dublin on the 14th inst.—HULL INGRAM, Esq., in the chair.

The requisition calling the meeting having been read,

The SECRETARY brought up the directors' report to be submitted to the meeting for adoption. The report stated that, notwithstanding the opposition which had been given to the company, the directors had the satisfaction to announce that shares had been already allotted to the amount of upwards of £15,000, and that applications had been made by contractors in England and Scotland, and others, for unallotted shares to the amount of £32,500. The directors expressed their intention to give in all cases a preference in the allotment of shares to resident consumers of gas, and to invite competition for their contracts relative to the supply of all requirements by means of public advertisements. They further stated that up to the present they had incurred no debts or liabilities, the preliminary expenses being defrayed out of the deposits on shares. In conclusion, the directors intimated their readiness to serve again if re-elected on this occasion.

The CHAIRMAN said that the company's affairs were steadily progressing, notwithstanding the opposition given to it, and the reports circulated to the effect that it could not go on, and that it could not supply gas to the public at the rate proposed. The directors had given these questions their best attention, and were convinced that the benefits promised by this company in producing cheap gas for the citizens would be fully realized. Gentlemen of high ability had stated that gas could be produced and supplied at 3s. 6d. per 1000 cubic feet, and leave a profit of 10 per cent., and that at a time when coals and all other requirements were far dearer than now. He adverted to the amount already represented by the *bonâ fide* shares of the company, and the numbers applied for besides, and expressed the determination of the directors to give the preference in the allotment of shares to citizens, consumers of gas, beyond all others, and said that many gentlemen were waiting for the meeting to be held in order to take a large number. He trusted soon to congratulate them on having a bright and cheap light which should eclipse the lights of other days. ("Hear," and laughter.)

Mr. JOHN PLASTO (Abbey Street) moved the adoption of the report.

Mr. M'GILL seconded the motion, which was passed unanimously.

Mr. WALDRON moved the re-election of the present board of directors.

Mr. O'LOGHLIN seconded the motion, and observed that the directors deserved the fullest confidence of the shareholders for their untiring zeal and economy.

The motion was put and carried.

Mr. MARTIN BURKE, T.C., congratulated his fellow-citizens on the prospect now opened to them of getting good and cheap light. Efforts were made to put it down. It had been alleged that gas could not be supplied so cheaply; and, in fact, it was sought to throw doubt and distrust on the public mind concerning the company—(hear, hear)—but these attempts should not succeed. The public wanted cheap light, and they would have it. (Cheers.) They had the Lord Mayor's support in this movement, and every member of the corporation who desired the welfare and advantage of his constituents would uphold it. (Cheers.) He himself, an old citizen and a large consumer of gas, had mainly helped, at a former period, to get the price of gas lowered 50 per cent. (Applause.) He considered that above all others the citizens of Dublin ought to get the preference in the allotment of the remaining shares. (Hear, hear.)

Mr. JOHN REILLY, barrister, said he had on the day previous intimated to the chairman and other gentlemen now present his intention of submitting one or two queries, and offering a few observations which he was convinced it would be well for them to consider maturely at this stage of the proceedings. (Hear, hear.) Surely it was a source of congratulation to him as to them all to see a project set on foot for establishing a new gas company on the principle of cheap supply of light to the citizens. Opposition was the life of trade, and if the inducements held out were capable of being realized, there was so much taxation avoided, so much money saved by the public. But, before committing themselves to an undertaking like this, and incurring its liabilities and expenses, they ought to look cautiously before them, and assure themselves as to what powers they possessed of being able to realize what they proposed. (Hear.) His object was to elicit the truth, and dispel any delusion which may have existed on one side or the other. It was said that this company had not powers to lay down their pipes, or to supply gas at the rate proposed. If these were delusions, the sooner they were got rid of by contrary and decisive proof the better. Their duty was to enlighten the public. The first question was—had they the power without an Act of Parliament to go on at all? He was with them; he wished to see this company vitalized; but it was contended that the company had no power to open the streets to lay down gas without obtaining a special Act of Parliament authorizing the same. He would, in the first place, ask an answer to that question.

Mr. ROSENTHAL, solicitor to the company, having been called on by the chairman, proceeded to reply to Mr. Reilly. He said it was not likely that so many gentlemen, wise and prudent men of business, would have gone so far in this undertaking without being well assured that the company had power under existing Acts of Parliament to go on with necessary works for the purpose. They had the opinion of the ablest counsel. He did not deem it necessary to enter into a detail of the Acts and clauses which conferred that power, but thought it sufficient to say that the corporation of Dublin possessed the power of allowing this company to open the streets and lay down their gas for supplying the public. Mr. Rosenthal here briefly cited the terms of a section in the gas clauses empowering the corporation "to contract with existing companies or any other persons."

Mr. FLINTOFF, secretary, said Acts of Parliament were dangerous things. There were only three gas companies in Ireland who had obtained Acts of Parliament. He quoted the new gas company of Cork city as an instance of streets being opened and gas laid down without a special Act. It would be of course the interest of the Dublin corporation to encourage a company which would supply gas so cheaply, and thus save them over £2000 a year in gas alone. The secretary then went into a detail of the special advantages expected to accrue from the new company.

Mr. REILLY said his question had not yet been answered. If that were all they had to depend on, and if they were to wait to lay down gas in Dublin till the corporation opened the streets for them, he considered it a lost case. ("Hear," and cries of "No, no.") In accordance with a wish expressed by the chairman, he had looked over the Acts of Parliament bearing on the subject, and his decided opinion was, that the company could not go on without an Act of Parliament. ("Hear," and cries of "We can.") He believed that the corporation could give permissive leave—that was to say, they would not prevent the company opening the streets, but any other person or persons before whose doors the streets were opened, could prosecute them. ("Hear, hear," and confusion.) The municipality of Cork was altogether differently circumstanced as contrasted with that of Dublin. So were other cities and towns in Ireland. They had power under the Act, but the empowering clause had been struck out of the bill which had been enacted for Dublin. (Hear, hear.) Some confused discussion followed, and the SECRETARY proceeded to refer to the Acts of Parliament, which, he held, gave power to the corporation of Dublin to contract with any parties for gas supply, and open the streets.

Mr. MARTIN BURKE said, as a member of the corporation, he was sure fair support would be given to a company offering to confer such a benefit on the citizens.

Mr. M'GILL observed that the company's engineer proposed to avoid all disturbance of the flags or street-ways, as he proposed to lay the pipes along beneath the kerb-stone of the footway.

Mr. REILLY replied to the secretary's statement, and adverted to what had occurred at Sheffield, where a similar gas project had been undertaken, and £50,000 expended on works. It was made aware that they had no power to go on, and the new projectors were driven to look for an Act of Parliament. They were opposed at a cost to them of several thousand pounds, and the shareholders lost the money, and the materials, works, &c., were sold as old iron. (Hear, hear.) At length, as a favour, the shareholders were permitted to amalgamate with——

Here some noisy interruption occurred, and, in the course of a rather angry discussion, Mr. FLINTOFF told Mr. Reilly that he was telling lies. After some further confusion,

Mr. FLINTOFF (secretary) proceeded to reply to Mr. Reilly. He said Mr. Reilly had departed from the truth, and that, in his opinion, Mr. Reilly had been sent there, and had received a consideration for so doing—in fact, his (Mr. Flintoff's) opinion was shaken as to Mr. Reilly's motives. He had been asked to pay Mr. Reilly for coming there, but he said, "Certainly not."

Mr. REILLY: That is a falsehood. (Confusion.)

Mr. FLINTOFF: You met me in the street, and asked me to pay you.

Mr. REILLY: That assertion is untrue, and the individual makes it knowing it to be untrue. (Great confusion.) Who would believe this?

A VOICE: I believe it. (Cries of "Shame," and great uproar.)

Mr. REILLY: There are too many here who know John Reilly, as well as Mr. Flintoff, to render it necessary for me to do more here than treat this insulting falsehood with silent contempt. So much for the personal outrage on himself. He would merely observe that he had never met the individual out of this room, save once. He had been requested to take five shares in this company, and he had done so. He would repeat that he was anxious for the company's success, and he only wished to save them from the imprudence of running blindfold into what might prove a fatal embarrassment. (Hear.)

Mr. FLINTOFF said that was all very well, but he believed that Mr. Reilly had been regularly drilled to tell those stories of Sheffield, &c., and his five shares were only got for a purpose.

Mr. REILLY would not deem anything this man had said worth notice; but it was simply the fact that he had been asked to take those shares, and he had done so. He had been asked to come to this meeting—the chairman and Mr. Burke had called and asked him——

Mr. BURKE did not remember.

The CHAIRMAN observed that he and Mr. Martin Burke had spoken to Mr. Reilly about attending the meeting.

Mr. BURKE: O aye! I suppose I did. I would be glad to see the meeting well attended; but I am grieved to see the proposer of O'Connell, as member for Dublin, throwing cold water on an undertaking so advantageous to his fellow-citizens. (Hear.)

Mr. REILLY begged to assure Mr. Burke that his only object was to prevent that project being defeated by the imprudence of the company themselves. ("Hear, hear," and uproar.) All he desired was to let them have the opinion of able counsel on a case properly prepared, and let it be seen

whether the corporation could give power to any company to break the streets without first contracting for gas with that company.

Mr. ROSENTHAL submitted the opinion of Mr. Bond Cox, which opinion, Mr. REILLY contended, bore out fully his objection.

Captain PERRY, after deprecating personalities, begged to move a resolution to the effect that a case be prepared for counsel on the point raised.

Mr. REILLY: I am happy to second that.

Mr. ROSENTHAL objected to the resolution being received without three days' previous notice, according to the rules of the company.

Captain PERRY then pledged himself to move a resolution to the same effect at the next meeting of the directors.

On the motion of Mr. BYRNE, Mr. Ingram left the chair, which was taken by Captain PERRY. Thanks were accorded to Mr. Ingram.

Captain PERRY intimated to Mr. Reilly that he would communicate with him on the nature of the case to be submitted for counsel's opinion.

The meeting then separated.

METROPOLITAN BOARD OF WORKS.

At the Ordinary Meeting of the Board held on Friday, the 14th inst., a report from the Main Drainage Committee was read, in which it was recommended that they should be empowered to authorize Mr. Oakley to enter into conditional arrangements with owners of property required for the construction of the northern high-level sewer and the main outfall sewer from the river Lea to Barking; and, when necessary, to concur with the agents of claimants in naming a third party to decide between them; all such arrangements being made subject to the approval and ratification of the board; and also to authorize him to employ an accountant to examine books, in cases of trade compensation; and that the necessary notices be served on the owners of land in the line of the northern high-level sewer and the main outfall sewer from the river Lea to Barking, stating the intention of the Board to enter upon such lands for the purpose of executing main drainage works.

The seal of the board was affixed to the contract for constructing the northern high-level sewer.

The main drainage committee also presented a report, stating that they have engaged the professional services of Messrs. Haslam and Buckland for carrying out the instructions of the board with reference to the houses and and lands requisite for the construction of the pumping-station at Deptford Creek, on the south of the Thames.—The report was received.

The finance committee reported the steps taken by them in negotiating with the Bank of England for a loan of £3,000,000 for the main drainage works. The Bank being willing to advance the sum at an interest of 3¾ per cent. per annum, the committee recommended the acceptance of those terms. —The report was adopted, and the finance committee were instructed to carry out the necessary arrangements.

PRESENTATION OF A TESTIMONIAL TO R. P. SPICE, ESQ., OF RICHMOND, BY THE MEN IN HIS EMPLOY.

On Saturday week a deputation from the workmen of Mr. Spice, consisting of the following resident superintendents of gas-works—viz., Mr. Middleton, of Wandsworth; Mr. Eldridge, of Richmond; Mr. Price, of Hampton Wick; Mr. Prosser, of Godalming; and Mr. George Smith, inspector, waited on that gentleman for the purpose of presenting him with a testimonial as a mark of their gratitude for his kindness to them as a master. As it was his birthday, several gentlemen were dining with him, and witnessed the presentation with considerable interest. Mr. Spice had not the slightest previous knowledge of such a gratifying demonstration.

Mr. ELDRIDGE stated that it had long been their wish to present him with some little testimonial as a token of their gratitude for the kind treatment they had ever received from him, and as that was his birthday they had taken that opportunity of doing so. He then read the following address:—

Richmond, Jan. 1, 1859.

TO ROBERT PAULSON SPICE, ESQ.

Honoured and dear Sir,—We, the undersigned, being at present (or recently) in your employ, beg to be allowed respectfully to congratulate you on the return of another birthday, and to join with others in wishing you health and happiness.

We wish to take this opportunity of expressing our warmest thanks for the kind treatment we have ever received from you as a master. Whenever we have applied to you under any circumstances of trial or difficulty, we have always received, not only your kind sympathy, but a most ready and liberal response. We know that through your and Mrs. Spice's kindness many a heart, bowed with sorrow and suffering, has been made to rejoice, and many a sick room has assumed a less saddened aspect through your liberality.

We now beg your acceptance of the accompanying inkstand. It is not of much value, but you will confer happiness on us by receiving it as a token of our respect, esteem, and grateful remembrance of your kindness.

May you, as you journey along life's chequered pathway, enjoy health, happiness, and prosperity. Our hearts' desire and prayer to God is, that His richest mercies may descend upon you, Mrs. Spice, and your dear children, and that you may long be spared to enjoy the blessings which your Heavenly Father shall bestow; and that when earth's joys and trials are over, may you enter into that rest which alone is to be found in the brighter and better world.

We remain, honoured and dear Sir,
Yours very respectfully.

The address was signed by fifty persons.

Mr. MIDDLETON then said, as he was his oldest servant, he had been requested to present him with the inkstand, which he hoped he would receive.

Mr. PRICE said, although he was not now in his employ, he felt the greatest pleasure in adding his subscription to show his gratitude to Mr. Spice.

Mr. SPICE (who seemed quite overcome) then said, they had taken him so entirely by surprise, and the language of the address had rendered him quite unable to express what he felt. He said he would receive it from them with thankfulness, as a highly valued testimony of their kind feelings towards him and Mrs. Spice. He should ever look upon it with the greatest pleasure, as an indication of the oneness of feeling and interest that existed between them, which he trusted would long remain. (His words of kindness were repeated again and again.)

The deputation left, with their feelings more than ever confirmed, "that but few men have such a master."

The inkstand, which cost twelve guineas, is very handsome, of the Elizabethan pattern, and was manufactured by Messrs. Savory and Sons, Cornhill. It has the following inscription on one side, and his crest on the other:—

Presented to Robert Paulson Spice, Esq., by his workmen, as a token of their gratitude for his kindness and liberality.

DR. R. ANGUS SMITH ON THE AIR OF TOWNS.

(*Continued from page* 20.)

Estimation of Organic Matter.

I have been trying for some time to obtain a measure of the amount of organic matter in the atmosphere. Among the first experiments with the manganates were the following, where an undetermined solution of permanganate of potash and manganate was put into a bulb apparatus, the air being drawn through it by means of an aspirator. It was soon found that results under similar conditions could be relied upon as constant.

Although these first numbers may be of some use as comparative results, I am not inclined to rely on them as giving absolute differences, until it is known what effect pure air would have, acting in exactly similar relations. That the results are correct in a comparative point of view is shown by the fact of the manganate of the first series of bulbs being more decomposed than that of the second series. I believe the time allowed by this method is not sufficient to enable the decomposition to take place so that a diminished result is obtained; and again, I am not sure as to the actual effect as before stated of pure air. The results, nevertheless, have their value as an approach to the next part of the subject. The air was drawn by an aspirator through a solution of putrid flesh.

Air from Putrefying Matter.

1.	0·38 cubic feet decomposed 250 grs. of a solution of permanganate of potash.				
2.	0·84	"	250	"	
3.	0·96	"	250	"	drawn through slowly.
4.	0·96	"	250	"	
5.	0·96	"	250	"	drawn very slowly.
6.	0·88	"	250	"	very rapidly.
7.	0·57	"	175	"	
	0·81	"	250	"	
8.	0·48	"	175	"	
	0·68	"	250	"	

In this case I did not attempt to approach more gradually than by steps of 25 grains, so that amounts nearly the same become as if identical.

Air from near an Ash-pit and Midden:—

1.	1·15 cubic feet decomposed 250 grs. of the solution of permanganate of potash.					
2.	1·15	"	250	"	"	"
3.	0·76	"	175	"	"	"
	1·08	"	250	"	"	"

Air from the lungs was found to decompose the manganate with much greater rapidity than common air.

It occurred to me then to use it as a test, not upon paper like litmus, as it will not exist in contact with organic substances, but on pieces of porcelain, so that we might judge of the impurity of the air by the time required for decomposition; but the surface rapidly dried—at least when a soda salt was used—and the crust protected the under portion from any change. Afterwards, nitrate of ammonia was added to keep it moist, but it was very difficult to obtain a surface on which the liquid would lie uniformly. It would be necessary to have it in constant revolution to keep up a uniform depth. By fixing a porcelain slab, moistened with permanganate, to the centre of the hands of a clock, the effect might be obtained if wanted.

But in reality this is scarcely desired, as the method afterwards adopted is not a great exercise to the patience; neither could we make any exact approach towards estimating the amount of air that came in contact with the slab or surface, as it would change with the state of the wind or other currents.

I came at last to the use of a single bottle or vessel of air, to be filled by means of an exhauster, as explained when speaking of the estimation of carbonic acid. In the stopper are two holes, each with tubes passing through them. As a stopper I have provisionally used only a cork—a very objectionable substance, but it is possible to avoid all contact between it and the manganate solution. One tube is fitted with a stop-cock below, close to the stopper; the liquid is poured into the upper part, and allowed to drop into the bottle by opening the stop-cock as it is wanted. The lower part of the tube projects an inch or two into the bottle, and is drawn out to a fine point, so as to keep it filled until pressed down by the column above, on the opening of the stop-cock. The other tube has connected with it an indiarubber tube and clasp. Its object is merely to allow a little air to pass out when the liquid is passing in. But the amount of liquid required is so small that this opening is scarcely necessary, the pressure of the few inches of column being generally enough to secure an entrance. The stop-cock and the mode of joining the tubes are matters of importance. The ordinary metals cannot be used, as they so rapidly deoxidize the manganates, and glass is troublesome and apt to break. I have, therefore, obtained stop-cocks of a substance not hitherto used by chemists generally, viz., hard vulcanized caoutchouc, made by Mackintosh. I expect great advantages from its use in chemical apparatus. It resists the action of nearly all the agents against which we have to defend our vessels at the ordinary temperatures, and is hard enough to be used for any ordinary purpose. I put one of these stop-cocks into a manganate solution, and could see no result till a much greater time had expired than the experiment will ever require. Nearly the same may be said of common indiarubber, although it cannot be used for stop-cocks; common valcanized caoutchouc cannot be used for a moment for this purpose in contact with the manganates. It is sometimes convenient to close the upper part of the tube into which the liquid is poured: this is done at present by a gutta percha stopper, but a caoutchouc stopper or stop-cock would be equally convenient, if not more so.

Having a little burette which held 140 grains, I poured the whole into the bottle and shook it, not knowing, of course, how much might be required. When the whole effect was supposed to be produced the bottle was opened, and the air sucked out, not having at the time a suitable pump.

By this means it required the bottle to be filled sixteen times before the whole of the solution was decomposed. The experiment when repeated still gave sixteen times. It seemed, therefore, a result which could be relied upon as constant.

In extracting the air from the bottle so as to allow the entrance of the external air, a great excess is of course used, and the surface of the liquid is exposed to a little more decomposition than is just to the experiment; but the results are, independently of this, so fine that I have not practically seen the evil, although it was afterwards guarded against. Besides, as the same amount is used in every experiment, the comparative results are not injured even if it is not guarded against. After using a flexible pump or inverse bellows to extract the air, 140 grains of the solution were always decomposed by nine bottles of the air at my laboratory. This method was used in all cases afterwards. The air is pumped out, and the external air fills the bottle. The use of the mouth for the purpose is only mentioned to guard against an imperfect mode of doing the experiment, as well as a process very fatiguing to the lungs.

When air is exceedingly pure, as upon the hills or on the sea-shore, it may be impossible to perform the operation in one bottle, even by the use of the smallest convenient amounts of solution. But as the process will probably be wanted most where the air is impure, the same mode may be used as is described for trying the carbonic acid, and the whole experiment finished by one act instead of repeated fillings.

The first experiments give chiefly multiples of a full measure of air, as I had no hope of arriving at anything finer. The actual limit of delicacy I am not yet able to give. To obtain a standard solution of permanganate for the purpose of testing organic matter, 10 grains of sugar were boiled with acid to render it uncrystallizable; when neutralized it was dissolved in 10,000 grains of water; 54 grains of this solution, or 0·054 of sugar calculated as cane sugar, decomposed 700 grains of a dilute solution of permanganate of potash. Every 10 grains of the permanganate are, therefore, capable of decomposing 0·000771 of sugar *.

This solution being used, the following results were obtained:—

1. Air from my laboratory, All Saints. 140 grains of solution decomposed by 783 cubic inches of air, or 9 bottles.
2. Air from the front of the laboratory or open street. 140 grains decomposed by 800 cubic inches, or 9¼ bottles.
3. Air from the back-yard. 140 grains decomposed by 658· cubic inches, or 7½ bottles.
4. Air from a bedroom (11 feet × 10 × 12), up two stairs and looking to the back; at night. 140 grains decomposed by 701 cubic inches, or 8 bottles.
5. In the morning, air from same room, in which a young man, aged 20, had slept. 614 cubic inches, or 7 bottles.
6. Front room of laboratory again. 833 cubic inches, or 9½ bottles.
7. Back of Medlock river, behind some small and not clean houses. 140 grains decomposed by 479 cubic inches, or 5½ bottles.
8. St. Michael's Place, back Irk Street, a closely-built neighbourhood, air from back-yard. 140 grains decomposed by 87·7 cubic inches, or 1 bottle.
9. Inside a rather cleanly-kept house in St. Michael's Place, but close to the back-yard. 175 cubic inches, or 2 bottles.
10. Front of the house. 438 cubic inches, or 5 bottles (nearly).
11. Air on the high grounds at Hoghton Tower, near Preston. 140 grains decomposed by 1929·4 cubic inches, or 22 bottles.
12. 50 grains decomposed by 701 = 140, for 22·4 bottles, or 1962.
13. Same air, 50 grains decomposed by 793 = 140 by 2084 cubic inches.
14. Same air, 50 grains decomposed by 701 cubic inches = 140 by 1962 cubic inches.
15. In a close carriage full of passengers, windows and doors closed, 140 grains decomposed by 175 cubic inches, or 2 bottles.

Supposing the sugar and the organic matter in the air were decomposed by exactly the same amount of manganate—a supposition which cannot be perfectly true, but which, from the minuteness of the amounts, leaves no room for a great error—the quantities of organic matter in the air would be in those cases such that the 140 grains given would be decomposed by 0·0108 grains of organic matter. When this is decomposed by 1 bottle, or 87 cubic inches of air, it is equal to 1 grain in 8058 cubic inches of air, or let us say 8000. The amount of organic matter in the atmosphere will then exist in the following amounts:—

		Cub. In.
1. Air at All Saints, inside the laboratory	1 grain in	72,000
2. Front of the house	"	74,000
3. Behind the laboratory	"	60,000
4 Bed-room looking to the back	"	64,000
5. Same room in the morning after being slept in	"	56,000
6. Front of laboratory again	"	76,000
7. Back of the Medlock, behind dirty houses	"	44,000
8. St. Michael's Place, behind a house	"	8,000
9. Inside a house at St. Michael's Place	"	16,000
10. The front of the house	"	40,000
11. High grounds 30 miles north of Manchester	"	176,000
12. " " " "	"	183,000
13. " " " "	"	209,000
14. " " " "	"	183,000
15. Closely-packed railway-carriage	"	8,000
16. When the strong smell of a sewer entered my laboratory	"	8,000

Leaving out the three ciphers, we have a range of from 8 to 200, and I feel assured that we may go much lower than 8, as I entered no spots which were very revolting.

The amount from putrid matter, when coming after these, will show the great evils to which we may be exposed, and the effects of different positions with regard to it.

The table of putrid matter on the preceding page, when put in this form, gives—

1.	One grain of organic matter in	20·5 cubic feet.
2.	" " "	45·0 "
3.	" " "	51·9 "
4.	" " "	51·9 "
5.	" " "	51·9 "
6.	" " "	47·5 "
7.	" " "	43·7 "
8.	" " "	36·6 "

It will be observed how much greater it is at first, but how the passage of air over it diminishes it. I may mention that this putrid matter was liquid, and the air bubbled through it, stirring it up. This removed the volatile matter, and less than half the amount was, after a time, found in it. But on being allowed a little rest, the putrefaction began again and increased. The putrefying matter was not in an extreme condition; it was, to a great extent, expended when I began the experiments.

The air of ash-pits, or rather of middens and cesspools, such as the repositories of fæces essentially are in Manchester, was tried, and gave—

Grs.		Cub. Ft.
1.	1 of organic matter, by the above mode of calculation, in	62·2
2.	1 " " "	62·2
3.	1 " " "	58·9

The regularity here is remarkable; we may arrive at the exact amount sent into the air per day by these places, but this I have not yet done. Although, as I said before, I do not rely much on the experiments made on the putrid meat, as far as amount is concerned, the results look probable, and give a range between the purest air and that from putrid matter of from 20 to 180,000, or from 1 to 9000 units.

It would result from this that, by breathing impure or putrid air, we might be inhaling 9000 times more of some organic substance or other than we should be doing by inhaling the purest air.

But without taking such high numbers, and leaving out those experiments on which I have not professed a reliance, and leaving entirely such putrid matter as I have referred to, we have in different air breathed by people in the same county, a substance the amount of which in one case is 22 times greater than in the other, and in air breathed by people in the same town a difference which is as 9 to 22.

These differences are not greater than are required in order to enable us to account for the numbers which represent the deaths of the various districts. In the district in which the highest numbers here given were obtained, there were, in 1855, 4·5 deaths in a hundred, whilst the average is 2·2 for the country. In other words, the number 22 which I have obtained is not more than is needful to account for a state of things which destroys nearly 60 per cent. of the population. At the place where the number 9½ is given, the deaths are not so high as the average of Manchester.

I find the action of the manganates to be much more rapid on sugar when it has lost its *catamorphous** condition by being boiled with acid. The action is then instantaneous, or nearly so. With crystallizable sugar it is slow. I have not yet decided how far this property may be relied on as a means of testing the amount of crystallizable sugar in a syrup. The action generally is more rapid on bodies tending to decay, and to some extent is a measure of the condition of bodies. This peculiar property may possibly be so far made use of as to enable us to arrive at some idea of the condition of a miasm or epidemic virus. If exceedingly active, it may act more rapidly than usual on organic matter. There is, therefore, a field of inquiry here†.

To prevent any doubt as to the fact of the vapours from putrid matter affecting this test, some mutton was put into a large closed vessel and allowed to putrefy. Some of this vapour, even after many days, as well as some after many months, being collected in a tube and treated with manganate of soda, instantly decomposed a very large amount, leaving, as it appeared to me, some organic matter which was not entirely resolved into an oxide of carbon and water; but, as these experiments are intended for another inquiry, it is enough for the present purpose to show that decomposition does take place when the only substance present is in the form of gaseous matter‡.

I should not omit to say that we must not lay too much blame on the sulphurous acid of the coals. There can be little doubt that it acts as a disinfectant of the putrid matter in towns, and any one with an attentive smell passing through the streets of this country and the cleanest towns of the continent must feel how vastly superior our atmosphere here is in respect of putrid matter capable of affecting that sense. Whilst, then, there is a great charge against the sulphur, we must not omit to speak so far in its favour. This was first mentioned to me by Mr. John Graham. It seems to me that the statistics of epidemics in large manufacturing towns fully bear out this belief, although a few cases present difficulties which my knowledge of the particulars does not allow me to clear up. It may, however, be said that if the ozone of the air oxidizes the sulphurous acid, it is rendered incapable of oxidizing the organic matter, and so the effect of the one is entirely lost, although the effect of the other is gained. Supposing they equally balanced each other, there still remains the sulphuric acid, to which we must attribute a disinfecting power of great value, although inferior to that of the sulphurous.

The sulphurous acid will readily act on sulphuretted hydrogen, and that gas is, I believe, largely removed from our atmosphere by the acid, and, excepting near its sources, is not much to be complained of, never attacking the senses in the streets excepting in these circumstances. One of its most fertile sources in all towns is the gas-works.

Action of the Air on the Blood.

No conclusion seems to have been arrived at respecting the exact nature of the effect on the lungs of the atmosphere of large towns and that supplied pure by nature. Many persons believe that no difference really exists, and that the different effects which are supposed to be experienced arise in reality from the different conditions and occupations of life. Not later than this week evidence has been given in a committee of the House of Commons ignoring any such differences. The phenomena which I have just explained will, I trust, put all question aside, although I feel assured that to those who have already studied the subject no proof of actual difference was needed.

The question might now be asked—What is the method by which the air of towns affects human life? The answer always has been, that it is principally through the medium of the lungs, and that the blood must in time become somewhat altered. That delicate and mysterious liquid has not, as far as I know, been made to explain the reaction.

Finding that an artificial test was capable of indicating the state of the air, it seemed to me probable that the blood, being in reality more delicate, at least with the assistance of time, might also undergo some peculiar change which might be made sensible to the eye.

I passed some ozonized air through blood, and found instantly a remarkable reddening. I then passed the common air of Manchester through another portion of blood, and obtained, after a few minutes, a very red colour. The effect of a very small amount of ozone, even a bubble of the ozonized air, was sufficient to give a maximum of brightness. The phosphorous vapours were not removed from the air, and I am aware that many substances in small quantities brighten blood. Of these, phosphoric acid is, I believe, one, but no such marked result was got by the acid alone.

Having familiarized myself with the appearance produced by shaking a measured portion of blood with a given amount of air, with repeated variations for several days, using both new and old blood, I proceeded to try the same at the sea-side. It was found that blood diluted with an equal volume of water was most convenient for many of the experiments, for although the colour and all the changes are somewhat different, the comparative results are exactly the same; it also very much assists the observation to have the results confirmed by both conditions. The blood also keeps longer when diluted. Of course, for many observations to dilute the blood is to destroy it. I had found that the experiments were not altered in character by using blood two or three days old, or even much older, but I so contrived as to begin the experiments at the sea within three hours after leaving them in Manchester, so that both the eye and the material might come fresh to their work.

I expected that the large amount of ozone in the sea-air would rapidly redden the blood, and that the reddening would be much greater than in Manchester. The effect was otherwise; it was decidedly less, and much less. The trials were repeated at various periods of the first and the next day, and with uniform results. It was not easily explained, but it was at least satisfactory to know that there was a difference.

Finding that phosphoric acid in small quantities gave a lighter colour to

* I now use oxalic acid, but the whole process must be separately described, and the standard employed fully explained.

* I have used *catamorphous* in opposition to *amorphous*. Hitherto there has been no equivalent; crystalline and others are only so in a restricted sense. *Catamorphous*, or *Katamorphous*, includes crystallized and crystallizable substances, and such as assume a recognizable form, whether well or ill defined.

† I have already found considerable diversity in this respect.

‡ Sometimes the term *manganate* is used when permanganate might be written, but it is not important, although the latter is preferred for organic substances.

the blood, I tried also minute quantities of sulphurous acid. The blood by this means is made less clear, as it seems to me,—of a lighter, but not such a rich red; after a while it becomes darker.

In order to obtain air perfectly free from the acid impurities of the town, it was passed through caustic soda into a bottle of the same size always used in the experiments, and air from the town was introduced into another. An equal amount of blood was poured into each without removing the stopper, by the means already described. When shaken, it was plainly seen again that the Manchester air caused a greater transparency or a lighter red.

By these experiments, in which I got no contradictory results, I conceive it is shown that the atmosphere of a town has a peculiar effect on the state of the blood, an indication of which is capable of being rendered distinctly perceptible to the ordinary eye. This will, in course of time, act for good or evil on the constitution. I say for good or evil, because, although I do not for a moment doubt the superiority of that condition of the atmosphere which nature has given us to breathe, over all other conditions induced by us, I can imagine that circumstances might arise where such a change as this alluded to might be favourable, or, in other words, where the atmosphere of such a town would have a favourable curative effect.

Many questions arise on this, and as I am not willing to speculate at present, even if I were sufficiently acquainted with physiology, but rather to inquire further, I shall venture only on a few remarks. In looking over the action of reagents on the blood, a great majority are said to make it red or vermilion. I was almost tempted to inquire whether observers had not mistaken the simple action of the air for that of the reagent, but I found that many acids and alkalies give this light colour under conditions when the action of the air alone could not explain it. May it not be that the abstraction of carbonic acid reddens blood, and that this is performed by the oxygen of the air taking its place in normal conditions, by alkalies absorbing it in certain experiments, and by acids assisting its departure in other experiments, and in the acid air of towns such as described? If so, we have an abnormal reddening caused by acid vapour, but, although greater, not productive of an identical effect, because not effected by the oxygen only, which is the agent for the natural decomposition required.

Another supposition I am better pleased with. If acids assist oxidation of the blood in the same manner as they do the oxidation of many other bodies, then they cause the action of the lungs to go on more rapidly and hasten the current of animal life, producing that greater restlessness of the system which is the peculiarity of great towns. I am inclined to believe that by following up this inquiry, such questions will receive a distinct answer. As the blood is such a delicate test, it is highly probable that the true action of various climates will best be known by studying in this manner the direct action of the atmosphere: it is true that an inorganic test capable of similar changes would be more convenient, but many will be needed to supply the manifold character of blood itself, and all the substances that can be used may still produce united effects explaining less than one experiment with blood.

If the true explanation be found in the increased oxidizing effect of the air of towns, the carbonic acid will not be so hurtful in the air as the sulphuric, although the latter exists in such small quantities. Mineral acid fumes, I know, by too much experience, are exceedingly irritating to the nervous system; at the same time, I am not aware of any experiments with carbonic acid and the blood, beginning with a natural, wholesome amount, and rising up by 0·01 per cent. at a time. I tried only a few hastily, with minute amounts, but got no such results as by sulphurous acid.

If, then, the eye can see those changes in the blood, it is not to be wondered at that those minute portions amongst which chemical changes act should, by their accumulated agency, influence the whole phenomena of life.

The plan of estimating the carbonic acid will give also every other acid equally, but when it is desired to know of any effect arising from acids stronger than carbonic acid, the blood itself may be used as a test. This, however, in the hands of any one who does not accustom himself to it, may give fallacious results, as the effect is best seen after many comparative observations.

The test for the organic matter will include also sulphuretted hydrogen and some other gases, but I do not suppose that carbonic oxide will be affected by either of the methods. The great sources of evil seem, however, to lie in decomposing animal matter and the acids.

The value of these tests will be known only when it has become a common experiment, and an easy one to ascertain the purity of an atmosphere and the efficiency of systems of ventilation, disinfection, and general purification.

I can readily imagine cases in which a fallacious result will be given, when, for example, the air is richly laden with the perfume of flowers; probably the materials producing the odour will be decomposed like putrid matter; but this must be left to further inquiry. Even in such cases, a great preponderance of odour is found prejudicial to the health, and the luxurious perfumes of autumn border closely on and readily pass into unwholesome emanations.

The breath is very variously affected, as we may suppose, by the state of health. I did not, however, find that it was capable, in the few cases tried, of decomposing as much manganate as the worst cases mentioned of air out of doors in unclean or crowded places. I found, however, remarkable differences in the amount of organic matter in the breath when sweet and when disagreeable. It is quite possible that this test may be used as an indication of the state of the stomach. In a few cases, I found that its condition was correctly registered.

Oxygen.

As to the amount of oxygen in the air, I fear I have not made a sufficient number of experiments, finding it inconvenient to experiment on air from the centre of the town. I did not adopt the precaution of collecting a certain quantity from one district, and making several analyses of the same specimen; each analysis, therefore, refers to a different specimen in reality, and it was found by the other methods of analysis, that the air is constantly changing in composition, and that these changes were found in the second decimal place at least, and even in the first. Having broken my barometer at the time, I was reduced to use an old one, consecrated certainly by the hands of its former owner, Dr. Dalton, whose old laboratory I used for the time, but not thereby improved in its results.

	Cub. C. Air used.	C. C. of H added.		C. C. After explosion.		Per cent. of Oxygen.
1.	40·731	73·176	—	24·113	=	20·868
2.	45·786	83·482	—	27·405	=	20·179
3.	33·125	74·582	—	20·677	=	20·807
4.	51·618	88·275	—	56·355	=	20·613
5.	93·107	170·240	—	112·150	=	20·793

These are, of course, the reduced numbers obtained. Leaving out the second, which is probably too small, the average will be 20·770 of oxygen. This will certainly agree with the numbers for carbonic acid very well, but I have, as I said, no evidence of the air being of a similar composition in any one case. I can scarcely call it an oversight, because, until I had become long familiar with the results, I had not become accustomed to view the atmosphere as so liable to frequent changes. The air outside the town should also be examined in connexion with this, and until then no conclusion can be drawn as to the exact effect of the chimneys. Dalton's observations (quoted in Gmelin*) were, for Manchester, 20·99, 20·95, 20·83; three miles from Manchester, 20·85. My experiments show a little deterioration. This, however, we may fairly say, that it is not from any want of oxygen that the air of Manchester or similar towns can be less fitted for health. The amount varies much more with the changes of temperature and pressure, and it is not to be conceived that such a slight change in the proportions could have any effect on the blood or the health. Besides, I consider that the experiment here recorded, where the air was passed through caustic potash, and was found to have lost its peculiar effect on the blood, sufficiently shows that the peculiarity was not caused either by the amount or proportion of the oxygen, as both of them remained unchanged. The diminution of oxygen may be looked on as amounting to from 0·1 to 0·2 per cent. With gusts of smoke this must be higher.

Ammonia in the Air.

I find only one experiment in which the ammonia was directly taken from air. 21·341 cubic feet of air were passed through an acid solution, and, on being treated with a platinum-salt, 0·0517 of ammonia were obtained. This is equal to 1 grain of ammonia in 412·42 cubic feet, or by weight 0·000453 per cent., or if saturated with sulphuric acid, 0·001758 of sulphate of ammonia. I have made no verification of this experiment; the place where it was made was in an open space at my laboratory, which, with a south-west wind, receives no smoke from factories. The ammonia here is sufficient to neutralize more than the amount of sulphuric acid found when the wind blows from the chimney districts. It shows, however, that, as in my earlier experiments, an alkaline atmosphere may occasionally be found. It happened, however, in this case that the air was acid, and that much more sulphuric acid was found than was needful to neutralize the ammonia. The sulphuric acid from the same air was intercepted by lead salt. The amount of sulphate of lead obtained was 0·6 grains = 0·2041 of sulphuric acid, and equal to 1 grain in 104·6 cubic feet. This is nearly as much as the theoretical amount calculated for the assumed space of sixteen miles, but it must be only occasional. The weather was moist, and in such a state of the air the acid falls rapidly with the rain, the earlier rain clearing all that is in the air. I do not doubt that, in the direct course of the smoke from a chimney, a much higher amount might be obtained, as it becomes then offensive to the smell, and sulphurous acid is strongly perceived. The utmost attainable limit in any given spot must be many times greater even than this.

Rain gave by the instrument—a short account of which I read to the Manchester Philosophical Society—

Carbonic acid, 5·133 cubic inches per gallon.
" 7·233 " "
" 7·233 " "
" 7·46 " "

By the use of the manganate, I obtained in one case 7·2, and in another the same amount as by the apparatus where the gases are removed by boiling, but the use of the former for water requires many precautions To obtain correct results, the organic matter must first be removed. If this method should turn out as successful as it has promised, the carbonic acid may be taken in 1000 grains of water in a few minutes.

Carbon in the Air.

By examination of several chimneys, I came to the conclusion that about 1 per cent. weight of the coal used is sent off in the condition of carbon or tarry matter. This will be equal to nearly 60 tons a day. Supposing it to be 60 tons, and the space alluded to filled equally with the vapour, with a thorough change twenty times a day, then only 3 tons would exist in suspension at a time in the atmosphere. This would be only 1 grain in 5689 cubic feet, or 1 grain in a cube of rather less than 18 feet (17·853). This is sometimes more, sometimes less than the truth, in all probability. It is about the truth for a very clear day. The half of this will be more frequently true. With 1 in 5689, or in the best seasons, we should breathe a grain of soot in twenty-one days: a small quantity, but it is given in irregular doses, and as it has a very large surface, a grain appears very large. The carbon separates from the rest of the smoke much sooner than the gases, and is often seen floating at a long distance from its source, when all the gaseous matter must have been removed, like the skeleton of the smoke alone, without the vitality of diffusion to decide upon any course.

Tarry Matters in the Air.

Besides the carbonic acid, as a result of the combustion of coal, the products of distillation must also be considered. In one case, I found exactly one-half of the carbonaceous matter of the smoke to be volatile. 100 cubic feet gave 8 grains of soot, 4 grains being volatile. If so, the amount which I have given for the carbon and tar, &c., may be stated thus:—

½ per cent. of the weight of coal used given off as carbon.
½ " " " " given off as tar, and other volatile products of coal, all of which may be included.
Or 30 tons of tar per day and 30 of soot,
Or 0·83 to 1½ " 0·83 to 1½ " in the atmosphere at a time.

Now, I have ascertained by experiment that some of these products are capable of decomposing manganates; and when judging of the unwholesomeness of a district by the amount of organic matter, care must be taken not to be misled by this. The error cannot be high, because if there be one-half of tarry matter capable of decomposing a manganate to 100 of coals, then the 99 of coals taken as carbon, which is near enough for the case, will give 363 of carbonic acid, or there will be only 1 of tarry matter to 726 of carbonic acid. The acid must, therefore, increase enormously before its accompaniment the tar can produce any effect. Besides, only a portion of this tarry or distilled matter is decomposable during the time of an ordinary experiment. It must not, however, be forgotten.

Smoke from common Fires.

1·604 cubic feet of smoke or gases from the chimney of a common fire, when the fire was smoking, gave—

Ammonia	0·0345
Sulphurous acid	0·1229
From a clear fire—	
Ammonia	0·0326
Sulphurous acid	0·7047

In the first there is a grain of ammonia in 46·5 cubic feet; in the second, a grain in 49 cubic feet. It is shown that the sulphur is burnt in greater part after the smoke has ceased, as common experience indicates. The

* "Handbook of Chemistry" (translation), vol. ii. pp. 407, 408.

ammonia does not diminish so rapidly as we might expect. It is, in fact, very difficult to remove the nitrogen from coal or coke. Some experiments which I made on the subject gave a great diversity in the amount, but a low heat seemed to send off very little, and a high heat evidently destroyed entirely a large proportion.

Effect of the Atmosphere on Stones, Bricks, Mortar, &c.

It has often been observed that the stones and bricks of buildings, especially under projecting parts, crumble more readily in large towns where much coal is burnt than elsewhere. Although this is not sufficient to prove an evil of the highest magnitude, it is still worthy of observation, first as a fact, and next as affecting the value of property. I was led to attribute this effect to the slow but constant action of the acid rain. If it affects substances with so great an excess of silica, it is not to be expected that calcareous substances will resist it long, and one of the greatest evils in old buildings in Manchester is the deterioration of the mortar. It generally swells out, becomes very porous, and falls to pieces on the slightest touch. Some mortar in this condition from a building behind the house of the Literary and Philosophical Society of Manchester was examined.

9·18 grains gave 7·57 of $BaOSO_3$, or 28·33 p. c. of sulphuric acid, = 48·16 per cent. of sulphate of lime.

It is not to be wondered at that iron oxidizes readily, and that galvanized iron is valueless in a district where the acid rain converts it at once into a battery. It will be observed that this style of roofing is preserved in exact proportion to its distance from manufacturing districts.

Iron by itself also becomes readily oxidized in this acid atmosphere. Bronze, too, is rapidly blackened, and articles of brass become affected to a great depth, losing their strength. I suppose the sulphurous acid forms on the surface a coating of sulphide of copper, whilst a sulphate is washed away if exposed to rain.

Carbon on the Surface.

The smoke of large towns is guilty of an offence to the eye, and through the eye it offends us both intellectually and æsthetically; in other words, the darkness and gloominess react on the character, especially of those not accustomed to the place, in such a manner as to make them distinctly conscious of a change; those accustomed to it are not conscious of the effect, nevertheless it acts upon them in such a way as to destroy some of the fine instincts of perception of natural beauty. But this is a long subject and a difficult one, leaving room for much difference of opinion. The actual amount of carbon on the surface of Manchester buildings is very small. It collects on the rough surfaces principally, and when mortar is put roughly on, it soon becomes perfectly black, although the red of the brick should remain moderately clear. Rough bricks also take it up in greater quantity, and become black in proportion to their roughness.

4·4 × 4 or 17·6 square inches gave of carbon 0·17 grs.
3· × 2·7 or 8·1 „ „ „ 0·02 „

The last is equal to 0·45, or about half a pound in a house 30 feet by 30. This is, I believe, a great deal above the mark; at least I believe a house will appear dingy with a minute portion of this. The experiment should be performed on a larger scale.

The fact that the rough portions retain the carbon suggests a cure, viz., smooth bricks. Polished or glazed bricks and similar mortar would render the rain capable of washing the carbon off, but certainly it will be much better not to allow it ever to arrive there. The importance of preserving the beauty of the original materials is daily increasing.

Can a Cure be found?

A cure for some of these evils ought certainly to be found. Already one cure for the evils connected with organic matter has been made known to us, and that is the removal of the impure matter by means of water. If disinfection were added to this, it might be made complete. The cure of the black carbon or smoke-burning is in the hands of every man. The smoke is always blacker as coal is cheaper. Our towns are not in earnest on the subject.

For the amount of sulphur in the air there has never been any attempt at a cure by any one, nor has it been generally looked on as an evil. A small beginning of this important subject occurred to me whilst investigating a patent obtained by Mr. Holme, of Manchester, for bleaching smoke. In this patent Mr. Holme claims the use of lime and of common salt mixed with the coals; but finding lime of no value in giving the peculiar white colour to the smoke, he gave it up, and used salt only. On examining the effect of the salt upon the vapour, I found that it diminished the quantity of the sulphurous acid given off, and on examining the effect on the ashes, I found a greater amount of sulphur in them than when otherwise treated. I give here the result of a few experiments made to ascertain the action of salt and bases.

Amount of sulphur driven off from a specimen of coal by distillation:—

Coal alone.

1. At a low red heat, 0·4692 per cent. of sulphur.
2. At a higher heat, 0·5655 „ „
3. At nearly white heat, 0·6755 „ „

Coal with common Salt.

4. With 5 per cent. salt, 0·4526 per cent. of sulphur.
5. Ditto at higher heat, 0·4843 „ „
6. Ditto, nearly white 0·5557 „ „

This makes a difference of 18 per cent. in the amount of sulphur sent off, the least being sent off by the mixture of common salt. It has, in fact, been long known that sulphur decomposes common salt, at least when the elements of water can be readily supplied, but still more may we expect it when carbon, &c., assist.

The remainder, or cinder, contained—

From No. 3 . . . . . 0·4332 per cent. of sulphur.
From No. 6 . . . . . 0·5448 „ „

Finding this result, it occurred to me that lime would be a much more efficient substance for retaining sulphur, the salt, on account of the white fumes given out, being entirely inadmissible. I distilled some coal with the following result:—

Coal distilled alone . . . . 0·4338 per cent. in the distillate.
Coal with 5 per cent. lime . . 0·1754 „ „
Coal with 10 per cent. lime . . 0·0511 „ „
Coal with ditto . . . . . 0·0616 „ „

It results from this that Mr. Holme had in his lime a cure for a great sanitary evil, but not knowing the effects, left it for a less valuable substance. I do not, however, propose lime as a bleacher of smoke, but as a remover of sulphur; and I think some mode of using this property may, on inquiry, be found. The mode of using it requires investigation, and many questions instantly suggest themselves. An inquiry by a public body would probably best find out the true mode of application, or bring to light a more efficient method.

GAS IN GERMANY.—Arrangements have been made by the town council of Zeitz, near Leipzic, with Mr. H. P. Stephenson, of London, to carry out gas-works for them during the present year.

GAS IN DENMARK.—Two small towns in Jutland have recently been lighted with gas—Viborg on the 3rd inst., and Veile on the 7th. The works have been erected by the Danish Gas Company, under the direction of Mr. Hawksley, the contracts for the apparatus having been taken by Messrs. Laidlaw and Sons, and for the main-laying by Mr. John Aird. The *Veile Avis* of the 8th inst. says: "Now can Veile also boast of being among the number of towns lighted by gas, and not by the 'electric light' with which Prœsto* intends in a short time to make itself celebrated. We are now more than satisfied with the gas, which yesterday, for the first time, gave us a good proof of its power. The lamps were first lighted between two and three o'clock in the afternoon, the old oil lamps being lighted at the same time for comparison, but the difference in the light was very great. The gas burnt clear and beautiful in the lamps, which are tastefully made. A great number of private consumers, at least sixty, used the new light. That the satisfaction was not shared alike by all must be considered to be the fault of inferior fittings in some of the houses. We are not quite ready with the lamps for the smaller streets, but the work is going on quickly."

EXPLOSION IN A CHURCH.—An accident, which was attended with some considerable damage, and which might have proved far more serious in its consequences, occurred at the parish church of Upton, Torquay, on the 7th inst. Mr. Parr, plumber of that town, and a workman, who were engaged in altering the gas-fittings, removed the meter in the western porch, and during morning prayers left the supply-pipe without being plugged. In

* A town (!) of 1100 inhabitants, in Zealand: the authorities have decided to wait until the above plan of lighting is perfected.

Price Current.

CASTINGS, PER TON.

Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle.	Wales.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 10 0	2 14 0	3 0 0	4 0 0	4 5 0
1½ and 2 inches Socket-Pipes	7 15 0	7 0 0	7 5 0	7 10 0	7 5 0
2½ and 3 „ „	7 5 0	6 15 0	7 0 0	7 5 0	7 0 0
4 and 5 „ „	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0
6 in. and upwards „	7 0 0	6 5 0	6 5 0	6 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 15 0	...	6 15 0	7 0 0	6 15 0
„ 2nd „ cold „	7 15 0	...	7 0 0	7 5 0	7 0 0
Tank Plates, ⅜ thick and above	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0

WROUGHT-IRON TUBING,

Subject to 40 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 ft., perft.	1 8	1 0	0 10	0 7	0 5	0 4½
„ „ „ 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-Pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
„ with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Plain Sockets [Nipples	1 3	0 9	0 8	0 6	0 5	0 4
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	0 3 —

COALS, PER TON.

Newcastle.—Unscreened.		*Scotch Cannel.*	
Whitwell Primrose	6s. 3d.	Boghead, at Leith	32s. 0d.
Medomsley, Eighton Moor, and Burnhope	6 6	Kirkness, best	23 0
Pelaw	6 9	Capeldrae, 1st quality	20 0
New Pelton, Peareth, South Pelaw, Washington Hutton, and South Peareth	7 0	„ 2nd „	12 6
Pelton	7 9	Lesmahago, at Glasgow	25 0
Ramsay's Newcastle Cannel	16 0	„ „ Leith	27 6
		Arniston	22 0
		Wemyss	20 0
		Knightswood	18 0
		Pirnie	15 0

SUNDRIES.

Best Newcastle Fire-bricks	per 1000	60s.	0d.
„ „ clay	per ton	12	0
Cliff's Fire-bricks, at Wortley	per 1000	57	6
Ingham's Fire-bricks, at Wortley	„	55	0
Tough Cake Copper ... per ton	£112	10s.	
English Pig Lead ... „	22	15	
Welch Bar Iron, in London „	7	5	
Tarred Rope Yarn	per cwt.	26s.	0d.
Foreign Spelter ... per ton	£23	0s.	
English Block Tin ... „	126	0	
Banca ... „	133	0	

FREIGHTS.

Coastwise—Newcastle.—Per Ton.		*Foreign.—Per Keel.*	
Chatham & Rochester	6s. 6d.	Boulogne and Calais	£8 10
Cork	9 0	Barcelona	22 0
Dover	7 0	Bordeaux	£14 to 14 10
Dublin	9 6	Cadiz	15 0
Exeter Quay	9 0	Copenhagen	—
Folkestone	7 0	Dieppe	£9 to 9 5
Hastings	—	Genoa	20 0
London (Pool)	6s. 6d. to 7 0	Hamburg	—
Lowestoft & Yarmouth . 4s. 9d. to	5 0	Havre	9 15
Lynn	6 6	Leghorn	19 0
Portsmouth	7 6	Lisbon	15 0
Plymouth	8 6	Rotterdam	—
Whitstable	7 6	Stettin	—
Weymouth	—	Trieste & Venice	£21 to 23 10

their absence an officer of the church, unconscious of what had been done, turned on the gas to give light at the organ, and, although it was soon turned off again, sufficient had escaped to fill the porch. When Mr. Parr's assistant returned, notwithstanding the strong smell of gas which he must have discerned, he thoughtlessly struck a match to proceed with his work. An explosion, of course, succeeded. It destroyed some woodwork, lately erected to prevent draught, and materially damaged the western door. The young man was much burnt in the face and hands, but he progresses favourably at the infirmary. The church is insured in the West of England office, the agent to which has given directions for the necessary repairs.

BILSTON GAS COMPANY.—The annual meeting of the shareholders of this company was held on Monday, the 3rd inst., at the Bull's Head Inn, Bilston. Mr. Bew presided, and, after the minutes of the last year's meeting had been read, proceeded to comment on the present state of the company, which, considering the depression of trade during the past year, is deemed highly satisfactory. The mains of the company have been considerably extended, and the property and plant has been much enlarged and improved. The profits of the year, made up to the 30th of September last, are shown to be £2195. 1s. 11d., besides an unappropriated balance of £114. 9s. 5d. from the previous year's profits, making together £2310. 5s. 2d. The report of the directors recommended the usual dividend of 8s. per share, payable on the 1st of March, and stated that the directors propose to make a general reduction in the price of gas at Lady-day next: they have already remitted the annual charge of meter-rent. Owing to the extensions of the past year, there is at present a balance of £598. 6s. 3d. due to the bankers of the company on the capital account, but the directors anticipate that the increased consumption will enable them to continue the dividends undiminished. The report having been received by the unanimous voice of the meeting (which was rather more numerous than usual), resolutions were passed in conformity with its recommendations, and the business concluded with a hearty vote of thanks to the chairman and directors, and a similar compliment to the auditor, manager, and other officers of the company.

AN EXAMPLE WORTHY OF IMITATION.—The directors of the Phœnix Gas-Works Company, which supplies the whole of Greenwich, Lewisham, and Lee, have, for some time past, paid great attention to the moral and intellectual condition of the workmen employed on their branch establishment in this borough, where they now have upwards of eighty men employed. In addition to a weekly meeting for religious instruction on Thursday evenings, similar gatherings have been held on Sunday afternoons. During last winter several classes were formed for the instruction, in reading, writing, and arithmetic, of those of the workmen who choose to avail themselves of the privilege, and a music class was also started and was well attended. Upon the approach of summer these classes, as might naturally be expected, were less numerously attended; but, on the return of the short days, efforts were commenced with a view to their more effectual resuscitation. Besides a comfortable room, capable of holding upwards of 150 people, in which the various classes have been in the habit of meeting, there are now in course of construction several rooms in which the men can take their meals when necessary, and which will also serve as dressing-rooms, to which hot and cold baths are also to be attached. We are also informed that the directors have it in contemplation to make such alterations in their present working arrangements as will free a certain proportion of the men from participating in such labour as must necessarily be attended to on Sundays, and thereby enable all in their turn to enjoy an unbroken Sabbath—an example which employers of labour generally would do well to follow. On Monday evening, a course of lectures to the workmen and their friends was commenced by an introductory address by the Rev. G. J. C. Duncan, of St. Mark's Presbyterian Church, Greenwich, upon "Air, Earth, Fire, and Water." The room was well filled by those for whom the entertainment was provided, and the proceedings having been commenced with singing and prayer, the lecturer proceeded to give an interesting delineation of the properties of the four compounds, which he showed were such, and not elements, as formerly imagined. At the close of the lecture, Mr. Hunter, sen., the superintendent of the works, addressed a few appropriate observations to the men, upon whom he impressed the desirableness of reflection as to whether they had sufficiently appreciated the privileges which the past year had afforded them, and urging them to value those privileges more highly during the coming year. The lectures are to be continued weekly, and the programme issued for the ensuing three months promises an abundance of interesting and instructive matter. Upon the success which may attend these lectures will, we are informed, depend, in a great measure, the establishment of a library for the use of the workmen.

Advertisements.

By Her Majesty's Royal Letters Patent.

JOSEPH BOULTON, Patent Dry GAS-METER MANUFACTURER, and also Maker of his Improved WATER METERS.
No. 28, BAGNIGGE-WELLS ROAD, CLERKENWELL, adjoining the Police Office.—Late of No. 1, Coppice-row, LONDON.
Experimental and Station Meters of any size made to order on the shortest notice.—Governors, Pressure Registers, Gas-cooking Stoves, and every description of Gas Apparatus.

ROBERT MACLAREN and CO., EGLINTON FOUNDRY, GLASGOW, Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

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WILLIAM RYDER, General MINERAL AND METAL AGENT AND MERCHANT, 4, DEAN STREET, NEWCASTLE-ON-TYNE,
is prepared to supply Gas and Water Companies with Apparatus and Appliances of every description, including Cast and Wrought Iron Goods, Coals, Fire-Bricks, Retorts, &c. &c.
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VULCANIZED INDIARUBBER AIR-TIGHT BAGS, any size, for Gas Mains, with flexible tubes attached, and fitted with stop-cocks complete.
Manufactory and Warehouse, No. 6, Goswell Road, LONDON (E.C.).

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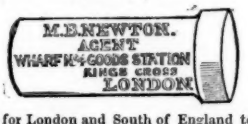

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N.B.—A few Retorts of each size, and a large stock of Bricks and Lumps, always on hand at the above Wharf.

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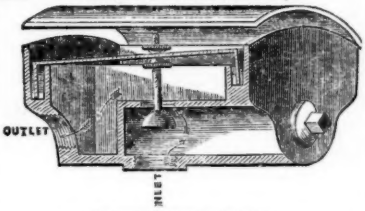

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THOMAS LAMBERT and SON, Short Street, New Cut, Lambeth, LONDON,
And is by them supplied wholesale at the following prices:—
½-in. for 5 lights, 15s. 6d. ¾-in. for 10 lights, 25s. 6d. 1-in. for 20 lights, 34s. 6d.
1¼-in. for 30 lights, 48s.
1½-in. for 60 lights, 63s. 2-in. for 100 to 150 lights, 93s. each.
A saving in the consumption of Gas of from 20 to 25 per cent. is effected by the use of this Regulator.
A liberal discount allowed to the Trade.

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MR. DEBENHAM has received In- structions to SELL by AUCTION, at the Mart, London, on TUESDAY, the 15th of February, at Twelve (unless previously disposed of by Private Contract), the valuable FREEHOLD PREMISES known as the HOWDEN GAS-WORKS, with the necessary Plant and Apparatus, and the Street Mains throughout the Town. The Works form the sole means of supply to this thriving town, and have been conducted since 1832 with steadily increasing success, the consumption of Gas in the town being at the present time threefold what it was fourteen years since, and an extension in the Mains being now required to meet the still rapidly increasing demand. The sale of these Works offers a first-rate opportunity to a young company or private individual of succeeding to a well-established and prosperous concern. The working expenses are exceedingly small; a personal supervision is by no means necessary; and the income may be depended upon with the utmost regularity.
The Works may be viewed and particulars (now ready) obtained of Mr. SUGDEN, the present Manager, at HOWDEN; of A. E. BARON, Esq., 12, Bishop's Lane, HULL; of WILLIAM BEVAN, Esq., Solicitor, 12, OLD JEWRY; and of Mr. DEBENHAM, Auctioneer, 80, CHEAPSIDE.

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Tenders to be sent to JAMES SPARKE, Esq., Clerk to the said Commissioners, on or before the 2nd day of February next, and from whom further particulars may be obtained.
The Commissioners do not bind themselves to accept the lowest or any Tender.
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WOLVERHAMPTON PATENT WROUGHT-IRON TUBE WORKS,
Originally established in 1833,
Manufacturer of Gas and other Tubes, Fittings, and articles of every description belonging to Gas, Water, or Steam.
E. D. had the honour of receiving the
PRIZE MEDAL
awarded to this Manufacture by the COUNCIL of the GREAT ENGLISH EXHIBITION of 1851; and from the latter date has supplied many towns exclusively with GALVANIZED and other Tubes for Gas and Water, under GOVERNMENT ENGINEERS.
A City, containing 150,000 inhabitants, has recently been entirely supplied with Tubes made at the above-named Works, and several others with populations nearly as great; in fact, the reputation now acquired induces this notice to the public.
Large Stocks generally on hand, averaging from one to three hundred thousand feet.
HYDRAULIC PRESS TUBES, to resist 6000 lbs. and upwards to the square inch, extensively manufactured.
STOCK DIES and SCREWING TACKLE, of the best possible description.
Every Tube carefully tested with Hydraulic Pressure before leaving the Works.

THE PURIFYING-HOUSE SUPERSEDED.

MR. LAMING (Inventor of the Revivified Oxide of Iron Purification) has the satisfaction to announce that Gas may now be purified in a manner that combines unusual commercial advantages with all the possible requirements of the sanitary officer and the public. All that need be said to call attention to the new process is, that instead of the purifying-house, two vessels of small area, placed after the condenser, suffice; that these vessels never have the least communication with the atmosphere; and that neither lime, oxide, nor any other substance foreign to the gas itself is brought into contact with it. Gas engineers will perceive among the advantages thus offered, economy in room, labour, and materials; impossibility of nuisance; and total absence of injury to the illuminating power.

Particulars by addressing RICHARD LAMING, 118, FENCHURCH STREET.

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PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

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Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.

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Manufactory for every description of Casting and Machinery for Gas Works and Water Works.

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MANUFACTURERS, &c.
UNION STREET, OLDHAM.

Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.

W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

GEORGE ANDERSON, Gas and
CONSULTING ENGINEER,
104, LEADENHALL STREET, LONDON (E.C.).

DIRECT-ACTING GAS-EXHAUSTERS,
supplied either with or without Steam-Engines and Boilers.

FOUR-WAY DIAPHRAGM VALVES,
one of which answers the purpose of THREE ordinary Valves, as applied to Purifiers, or in shutting off and passing Station-Meters, Governors, or other apparatus, while the Connecting-Pipes are also much simplified.

RETORT SETTINGS,
designed to be heated by Tar alone, and with a total absence of Smoke.

Illustrated circulars, giving references and every information, may be obtained on application as above.

GAS-WORKS ERECTED, ALTERED, VALUED, OR LEASED, BY

GEORGE WALCOTT, Gas and
CONSULTING ENGINEER,
BEAUMARIS GAS-WORKS, ANGLESEA,

who has erected twenty Gas-Works during the last four years, all of which are giving satisfaction.

London Office, 24, Abchurch Lane, CITY.

ALFRED PENNY, Engineer,
WENLOCK IRON WORKS,
WHARF ROAD, CITY ROAD, LONDON.

Mr. PENNY begs to inform Gas and Water Companies that he undertakes the erection of new, or the alteration of existing, works; and that he may be consulted generally on all matters connected with gas and water supply. He is also prepared to supply best Cold-blast Retorts, Socket-Pipes, and Connections, Iron Borings, &c. &c., and all the necessary Castings used in Gas and Water-Works.

*** Country orders executed with care and despatch.

By Her Majesty's Royal Letters Patent.

JAMES MEACOCK,

PATENT DRY and IMPROVED WET GAS-METER WORKS,

7, SNOW HILL, AND 16, WEST STREET, LONDON.

ESTABLISHED 1836.

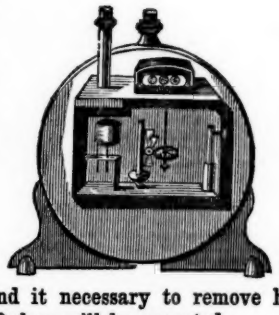
J. MEACOCK begs to call attention to his patent method of securing the Leather diaphragm of his Dry Meter. Instead of using the soldering iron for this purpose, it is held between two flat Metal Rings, and screwed up sound to a metal frame, as shown in the drawing.

By this improvement the perishing effect of hot tools to leather being avoided, its durability must be longer; also, its repair when needful is most simple, as a new leather diaphragm can be applied by merely unscrewing the old one from the rim or frame to which it had been screwed up.

Meters of Gas Companies being subject to so much wear and tear, J. M. begs leave to assure those who may honour him with their commands, that nothing but the stoutest materials for cases, the hardest gas-resisting metals, and best foreign leather for the interiors, will be used, and none but first-class workmen employed in their construction.

Wet Gas-Meters Repaired and Reconstructed with J. Meacock's Modern Improvements.

METERS SENT ON APPROVAL.



In consequence of the great demand for the above Meters, J. Meacock has found it necessary to remove his Manufactory to more extensive Premises, 16, West Street, Smithfield, where Orders will be executed on the shortest notice.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

WHITEHOUSE and CO., Boiler and GASHOLDER MAKERS,
GLOBE PATENT TUBE WORKS,
WEDNESBURY,

Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.

Orders promptly executed.

NOW READY,

VOL. VI. of the JOURNAL of GAS LIGHTING, WATER SUPPLY, and SANITARY IMPROVEMENT, for 1857, price 21s., bound in cloth and lettered. A few copies of Vols. II., III., IV., and V. are still on sale.

W. B. KING, 11, Bolt Court, Fleet Street.

M. SHEEN, Gas and Railway Lantern Maker, 90½, Holborn Hill, begs to inform Managers of Gas-Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

PADDON and FORD respectfully invite the attention of Gas Companies and Managers to their PATENT STREET LAMP REGULATOR, which ensures any required consumption.

By its use a great saving is effected, and the item of "Unaccounted-for Gas" considerably decreased.

PADDON and FORD, Patent
GAS-METER AND APPARATUS WORKS,
GRAY'S-INN-ROAD, LONDON,

Manufacturers of WET and DRY GAS METERS, STATION METERS, GOVERNORS, EXPERIMENTAL APPARATUS, LANTERNS, &c. &c.

Contractors for the erection or alteration of Gas-Works; and every description of Apparatus required in Gas-Works supplied.

TO THE GAS COMPANIES
OF GREAT BRITAIN AND THE CONTINENT.

CANNEL AND COAL FOR GAS PURPOSES.—Fifteen years' connexion with one of the largest Gas Concerns in England, enables us from practical experience to certify that the CANNEL and COAL we offer are those best suited for Gas purposes.

On application, we shall have much pleasure in forwarding our Tabulated Statements of Analyses, with Prices and Terms; also References as to respectability.

All Contract Orders have our careful and best attention.

EMANUEL TURNER and Co., Exporters of Cannel and Coal, 34, Castle Street, LIVERPOOL.

HARRIS and PEARSON,
PROPRIETORS OF
BEST CLASS-HOUSE POT AND CRUCIBLE CLAY.
MANUFACTURERS OF
FIRE BRICKS GAS RETORTS &C.
AMBLECOTE FIRE CLAY AND BRICK WORKS,
STOURBRIDGE.

Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.

BENJAMIN GIBBONS, Jun.,
DEEPDALE FIRE-CLAY & BRICK WORKS
Near DUDLEY,

Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.

FIRE-CLAY RETORTS,
TO MODEL OR DRAWING.

B. G. begs to call the attention of Gas Companies to his Fire-Clay Retorts, which have been used with great satisfaction in some of the largest Gas-Works in the Metropolis and many Provincial Towns in England.

References given, if required.

CEMENT.

G. and T. EARLE, Hull, beg to draw the attention of Gas and Water Companies, Engineers, and Contractors, to their Light Cement, for Stuccoing and Building Gasholder Tanks, and Jointing Iron Pipes, for which purposes it will be found a very superior article.

FIRE-CLAY GAS RETORTS.

ESTABLISHED IN 1795.

JOSEPH CLIFF,

WORTLEY FIRE-BRICK WORKS, near LEEDS.

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surface.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

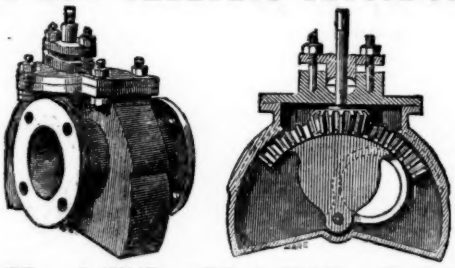
THE WORKS ARE WELL SITUATED

For EXPORT from the Ports of { LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

M. B. NEWTON, London Agent, No. 4, Wharf, King's Cross Goods Station.

BEST AND CHEAPEST SLUICE-COCK.



BROWN AND MAY'S PATENT.

Above 3-inch diameter, price 10s. per inch. Brass face, 6d. per inch extra.

Can be taken to pieces without being removed from the line of Piping.

NORTH WILTS FOUNDRY, DEVIZES.

Wholesale Agents, Messrs. S. and E. RANSOME, 31, Essex Street, Strand, E.C., Where a Sample may be seen.

WILLIAM PARKINSON AND CO.,

(Successors to the late Samuel Crosley,)

COTTAGE LANE, CITY ROAD, LONDON,

Beg to announce that, in addition to the manufacture of GAS-METERS, they continue the manufacture of METERS for MEASURING WATER, SPIRITS, &c., commenced, under Patent in 1849, by the late Mr. William Parkinson.

These Meters are as simple and durable as the Gas-Meter, and as correct as that instrument in the registration of the fluids passing through them.

JOHN BENT, Manufacturer of GAS-METERS,
283, BELL BARN ROAD, BIRMINGHAM,
(Established 1830),

Begs respectfully to call the attention of Gas Companies, Engineers, &c., to his WET GAS METER, made upon the most improved principles, the most admirable materials, and warranted to register correctly.

"ALL DOUBTS REMOVED."

DEFRIES' celebrated Dry Gas-METERS, of which there are 80,000 in use in Palaces, Churches, Chapels, Royal Dock-yards, Club Houses, Public Offices, and other buildings throughout the Empire, the Continent, and Colonies.

His meter for 1500 lights, in use upwards of ten years at the Royal Italian Opera, until that building was destroyed by fire, was long afterwards dug out of the burnt ruins, then tested by the Chartered Gas Company and found inflexibly correct.

On the 9th of June, 1858, at the Western Gas Company, his meter for 150 lights, after considerable use, was doubted, and subjected to the most variable tests, from the full lighting down to a single jet, and in each case, as in numerous other instances, accuracy was finely indicated.

His two large meters at the Thames Tunnel have been in constant use day and night for upwards of twelve years (one continuation of dark hours), subjected to the wear and tear of 75 years, as compared with the ordinary hours of using gaslight above ground.

Gas Companies honouring Mr. Defries with their commands for his PATENT DRY METER, which has done so much service in simplifying the fitting up of gas, as well as checking surreptitious burning, will be guaranteed perfection for five years free of charge.

Defries' Prize-Medal Gas Baths, Gas-Cooking and Heating Stoves. The Polytechnic Gas Fire, with indestructible fuel, in daily operation (Saturday excepted) at the Office, 406, Euston Road, Fitzroy Square, LONDON.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

London Agents: CHADWICK and AKEROYD, Willington Stone Wharf, Regent's Park Basin.

A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.—Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

ALEXANDER WRIGHT,

GAS ENGINEER, MANUFACTURER OF GAS-METERS, GOVERNORS, AND EVERY DESCRIPTION OF GAS APPARATUS,

55, MILLBANK STREET, WESTMINSTER.

CONSUMERS' METERS at the List Price, with a Liberal Discount to Wholesale Purchasers.

THOMPSON'S BROMINE TEST, £1. 1s.—BROMINE, 3s. per Ounce.

BISULPHURET OF CARBON TEST, £2. 2s.

APPARATUS FOR DETERMINING THE HEATING POWER OF SAMPLES OF COAL AND OTHER DESCRIPTIONS OF FUEL, £5. 5s.,
INVENTED BY LEWIS THOMPSON, ESQ., M.R.C.S.

REGISTERING PRESSURE GAUGE, Net Price, £8. Glass Shade, 10s. extra.

STATION METERS, PRESSURE GAUGES, PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, &C.

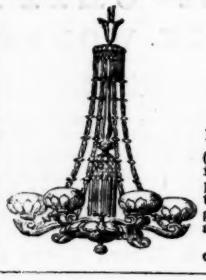
JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD,
CITY ROAD, LONDON,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including best cold-blast Iron Retorts, Socket and Flange Pipes of all sizes, Bends, Branches, Syphons, Lamp Columns of various patterns, &c.

N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.

CHARLES HORSLEY, Agent.

C. H. is prepared to carry out the warming and ventilation of public buildings, &c.; also civil engineering in general.



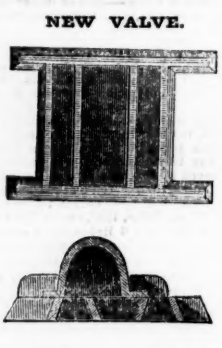
F. & C. OSLER,
44, OXFORD STREET, LONDON;
Manufactory—Broad Street, Birmingham—Established 1807,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.

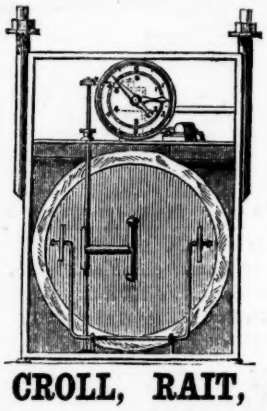
ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upwards (Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of GAS in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.

THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

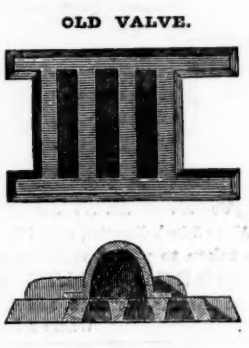
CROLL'S
PATENT IMPROVED DRY GAS-METER,

NEW VALVE.





OLD VALVE.



Manufactured by CROLL, RAIT, and CO., LONDON.

FACTORY—Blundell Street, near the Railway Station, Caledonian Road, N.

OFFICES—10, Coleman Street, City, E C.

Messrs. CROLL, RAIT, and Co. beg to call the attention of Gas Companies to their Improvements in Dry Gas-Meters, which secure a steady light under all circumstances.

In forming the Valve-Seat of the Dry Gas-Meter it has hitherto been usual for the Bars to be equal in width to the openings; but, by the extent of the surfaces thus brought into contact with the Valve or Cover, it is found that fluid accumulates, and, during part of the motion of the Valve, partially closes the passage, thereby causing an oscillation in the lights.

An Improvement in the Manufacture now introduced and patented by Mr. CROLL consists of very considerably reducing the width of the Surfaces or Bars, as in the drawing of the New Valve, retaining only such width of bar as is necessary to secure correct measurement.

Another Improvement consists in the mode used of mixing and amalgamating the various proportions of Metals for the Valve, always taking care that the Valve-Seat shall be of an alloy considerably different to that of the Valve-Cover, by which the friction of the surfaces is materially lessened.

These Improvements remove at onee any liability to unsteadiness of light, and at the same time secure (from the Valve working more evenly) a greater certainty of accurate registration.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,

invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT-IRON PIPE, BLACK & GALVANIZED. COPPER, TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—60s. net.

Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.

Sole Manufacturers of Church and Mann's Photometer.

Large Pattern Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by WILLIAM BOUGHTON KING (at the office of Joseph Clayton, 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, January 18, 1859.